TUOLUMNE RIVER MINING REACH RESTORATION
PROJECT No. 1 (7-11 SEGMENT) OF PHASE 2

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F1-136

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APPLICANT:

The Turlock Irrigation District is a California irrigation district, a political subdivision of the State of California. TID is a tax exempt public agency.

CONTACTS:

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PARTICIPANTS:

Tuolumne River Technical Advisory Committee (TRTAC) made up of the Turlock Irrigation District, Modesto Irrigation District (ModID), City & County of San Francisco (CCSF), California Dept. Of Fish & Game (CDFG), and the U.S. Fish & Wildlife Service (USFWS). Collaborating stakeholder groups with TRTAC are the Tuolumne River Preservation Trust, Friends of the Tuolumne, California Sports Fishing Alliance , Bay Area Water Users Association, National Resource Conservation Districts, and local landowners.

COST SHARE PARTICIPANTS:

USFWS through the CVPIA AFRP and TID, ModID, and CCSF providing funds through the TRTAC.

PROJECT GROUP:

Group 1 The CALFED is being asked to fund only portions of the public works construction for this project.

TUOLUMNE RIVER MINING REACH RESTORATION
PROJECT NO. 1 (7-11 SEGMENT) OF PHASE 2

II. EXECUTIVE SUMMARY

SUBMITTED BY: TURLOCK IRRIGATION DISTRICT

DESCRIPTION:

The overall Mining Reach project involves restoration of instream aquatic habitat and shaded riverine aquatic habitat for the primary benefit of San Joaquin fall-run chinook salmon within a 6.1 mile reach (River Mile 34.2 to 40.3) of the lower Tuolumne River below La Grange Dam. It includes construction of a system of setback levees along those offstream gravel mining portions of the Tuolumne River channel damaged in the January 1997 floods. The Mining Reach project will return this portion of the river to a more natural, dynamic channel morphology that will improve, restore and protect instream and riparian habitat for fall run chinook salmon survival, including restoring hydrological and geomorphic processes. Portions of the 6.1 mile long reach will be reformed to a minimum 400 to 500 foot wide riparian floodplain recreating a riffle and run pattern that follows the restored meander channel of the river along with native vegetation planted on restored river terraces in a mix similar to that found on undisturbed segments of the river. The project requested to be funded by CALFED is designated Project No. 1 (7-11 Segment, river mile 37.7 to 40.3) of Phase 2 of the Mining Reach Project.

BIOLOGICAL OBJECTIVES:

1. Restore and increase habitat for natural salmon production.
2. Reconstruct a natural channel geometry scaled to current channel forming flows.
3. Restore native riparian plant communities within their predicted hydrological regime.
4. Reduce salmonid fish predator habitat.

TASKS & SCHEDULES:

1. to 8.	Non CALFED funded tasks from Aug 97 to Mar 98.	
9.	Bidding on construction of 7-11 Segment in Phase 2:	Apr 98
10.	Construction of 7-11 Segment in Phase 2:	Jun 98 through Oct 98
11.	Bidding on revegetation of 7-11 Segment in Phase 2:	Oct 98
12.	Revegetation of 7-11 Segment in Phase 2:	Dec 98 through Feb 99

JUSTIFICATION:

The fall run chinook salmon in the tributaries of the San Joaquin River are currently listed as a species of concern by the USFWS. Anadromous salmonid populations in the lower Tuolumne River require adequate ecosystem health to achieve and sustain their productivity. Restoring and maintaining dynamic geomorphic processes are crucial for insuring healthy river ecosystems with natural productive salmonid populations. When complete restoration of a river ecosystem is infeasible, as for alluvial rivers regulated by dams, limiting factors must be identified for prioritizing actions that would best improve the ecosystem, particularly salmonid habitat.

BUDGET:

The CALFED is being asked to fund some of the construction and revegetation portions of Project No. 1 (7-11 Segment) of Phase 2 of the overall Mining Reach project. The total amount being requested from CALFED is $2,801,000, consisting of $160,000 to purchase fill material, $15,000 to regrade the river channel, $254,800 for setback levee construction, $2,049,000 for floodplain reconstruction, and $322,200 for project and construction management. The CEQA, NEPA, permitting, and construction design needed prior to flood plain reconstruction will be paid with cost share funds by TID, ModID, CCSF, and USFWS-AFRP. USFWS-AFRP is also being asked to fund the balance of the public works construction.

APPLICANT QUALIFICATIONS:

Since 1971, TID, ModID, and CCSF have, in cooperation with DFG and USFWS, monitored river conditions and developed programs that enhance natural production of fall run salmon. Tim Ford has been the District's staff biologist for the TID and ModID since 1981. Personnel with the biological consulting firms EA Engineering and Stillwater Science have been conducting numerous fish studies for TID and ModID on Tuolumne and San Joaquin River salmon since 1987. McBain & Trush, geomorphic consultants, have experience in developing restoration plans for river systems in California.

MONITORING PLAN:

There are several monitoring components in a project like this, including the development of appropriate and effective monitoring methods for this type of river restoration work.

1. Physical habitat changes: Pre and post construction changes will be recorded from the as-built engineering drawings. This assures that the desired channel contours and cross sections were built as designed and these as-built records can be used to assess geomorphological changes after major flood events.
2. Riparian habitat changes: Revegetation will require annual inspections during the first three years to confirm survival of planted materials, perform replanting if deemed necessary, and to assess natural changes in the vegetation mix. Monitoring vegetation would then be reduced to evaluations after significant flood events.
3. Fish population changes: This will involve evaluation of pre and post project changes in habitat conditions for both fish predators and salmon. Monitoring criteria would include items such as flow velocity, temperature, comparisons of estimated transit time through the old vs new stream channel, combined with sampling and observations of fish populations and spawning riffle conditions.

LOCAL SUPPORT; COORDINATION WITH OTHER PROGRAMS

The overall Mining Reach project has been approved by the TRTAC participants. The TRTAC has allocated $50,000 in cost share funds to be provided by TID, ModID, and CCSF for this project. Coordination meetings have been held with the affected aggregate mining operations and landowners in the Mining Reach as well as with federal, state and county agencies. Recognizing that their individual concerns need to be addressed, the mining operators and land owners have been cooperative and supportive of the project. USFWS has been supportive of the project and is working with TID to obtain AFRP funding for portions of the overall project.

III. PROJECT DESCRIPTION

PROJECT DESCRIPTION AND APPROACH

The Tuolumne River Technical Advisory Committee (TRTAC), under the auspices of the 1995 Don Pedro Project Settlement Agreement (FERC License No. 2299), is developing a plan to restore instream aquatic habitat and shaded riverine aquatic habitat for the primary benefit of San Joaquin fall-run chinook salmon in the Tuolumne River below La Grange Dam. The TRTAC has identified as a high priority project the restoration of a 6.1 miles reach (River Mile 34.2 to 40.3) damaged in the January 1997 floods. This is called the "Mining Reach" because there exists active sand and gravel mining operations within this reach. The geomorphologic firm of McBain & Trush has developed a detailed description of the proposed restoration work for the TRTAC; a copy is attached to this proposal for your information and reference.

The Mining Reach project will return this 6.1 mile reach of river to a more natural, dynamic channel morphology that will improve, restore and protect instream aquatic habitat and shaded riverine aquatic habitat for San Joaquin fall-run chinook salmon productivity and will help restore natural hydrological and geomorphic processes. Portions of the 6.1 mile long reach will be reformed to a minimum 400 to 500 foot wide riparian floodplain recreating a riffle and run pattern that would follow the restored meander channel of the river and native vegetation will be planted on restored river terraces in a mix similar to that found on undisturbed segments of the river. The riparian reforestation is intended to provide food and shade for juvenile salmon. Terrestrial species will also benefit from a more continuous corridor of riparian habitat in the restored areas. The wider river channel will allow channel meander to provide a sustainable and dynamic river morphology, i.e., flood-related channel-bed movement with periodic scour, that partially or fully restore the processes associated with natural salmon production and survival.

The Mining Reach project is divided into two phases—Phases 1 and 2—with Phase 2 consisting of Projects or Segments 1, 2, 3, and 4. The Phase 1 (described below) will be funded by available CVPIA AFRP funds with a TID-MID-SF contribution towards permitting costs. Once the Phase 1 work is completed, then the four segments under Phase 2 could be built over a four year period. The sequence of segments to be constructed and the associated source of funding are intended to allow finished work to remain structurally sound against a designed flood event of 15,000 to 20,000 cubic feet per second in case subsequent funding is delayed or not forthcoming. McBain & Trush designed the Mining Reach work so that it would tie into the downstream Reed restoration project funded by the 4-Pumps program and scheduled for construction in 1997.

This proposal seeks CALFED funding for a portion of the restoration work for the "7-11 Segment" or Project No. 1 of Phase 2. It is called the "7-11 Segment" because 7-11 Materials has its sand and gravel operation within this portion of the Mining Reach. This Project No. 1 can be seen as a demonstration project to test the effectiveness of the proposed restoration project

design and work for the other segments of the Mining Reach and the feasibility of performing similar type fish and riparian habitat restoration work in other rivers and streams within the Central Valley. Follow-on proposals for CALFED funding will be submitted for additional Phase 2 projects.

Phase 1 Work (not funded by CALFED). Phase 1 involves work in all four segments of Phase 2. Temporary repair work to fix breaches in existing levees that separate the active mining areas from the river is already being performed by the aggregate mining operators under their existing permits and at their cost. These temporary repairs will allow permanent reconstruction work to proceed at a time when such work would not be allowed in the active river channel. Also, some of the materials used in the temporary repairs will be recovered and reused in the later construction of permanent setback levees and riparian floodplain. CVPIA AFRP funded Phase 1 will consist of moving levee roads to widen portions of the river channel, constructing short segments of permanent setback levees in key locations, and installing bio-engineered bank protection along areas where the haul roads have been relocated. Permitting and construction design work for this Phase 1 work is projected to take place during the summer and fall of 1997 to provide the detailed information for construction work to be performed during the fall and winter of 1997 and summer of 1998.

Project No. 1 of Phase 2 Work (portion requested to be funded by CALFED). The Project No. 1 work would start in the summer of 1998. The work would include the permanent channel reconstruction and major setback levee work not performed for the 7-11 Segment in Phase 1. The setback levees will require significant quantities of imported materials to fill in deep pit areas created by past gravel mining, but this will re-create a riffle and run pattern that follows the restored meander channel of the river. The channel will be reformed into a 500 foot wide riparian flood plain complete with native vegetation in a mix similar to that found along undisturbed segments of the river. The channel will be hydraulically sized using currently regulated flows to be an active riverine channel with full grown riparian vegetation. These regulated flows periodically could reach as high as 15,000 to 20,000 cfs for short periods. It is anticipated and planned that during these high flow events there will be some movement of the channel within the flood plain to expose added spawning materials and clean existing spawning gravels. To minimize long term future maintenance expenditures, this restoration work is being designed with the intent to provide a self maintaining riparian floodway channel once the revegetation is completed and established.

LOCATION

The overall Mining Reach project covers a 6.1 mile length of channel and is located on the lower Tuolumne River, between river mile 34.2 and river mile 40.3, approximately 23 miles east of Modesto in Stanislaus County as shown in Figure 1. Project No. 1 (7-11 Segment) of Phase 2 is between river mile 37.7 and 40.3.

EXPECTED BENEFITS

1. Reduce salmonid stranding in gravel mining ponds during levee breaks that occur at high river flows and flood events.
2. Restore and increase habitat for natural salmon production.

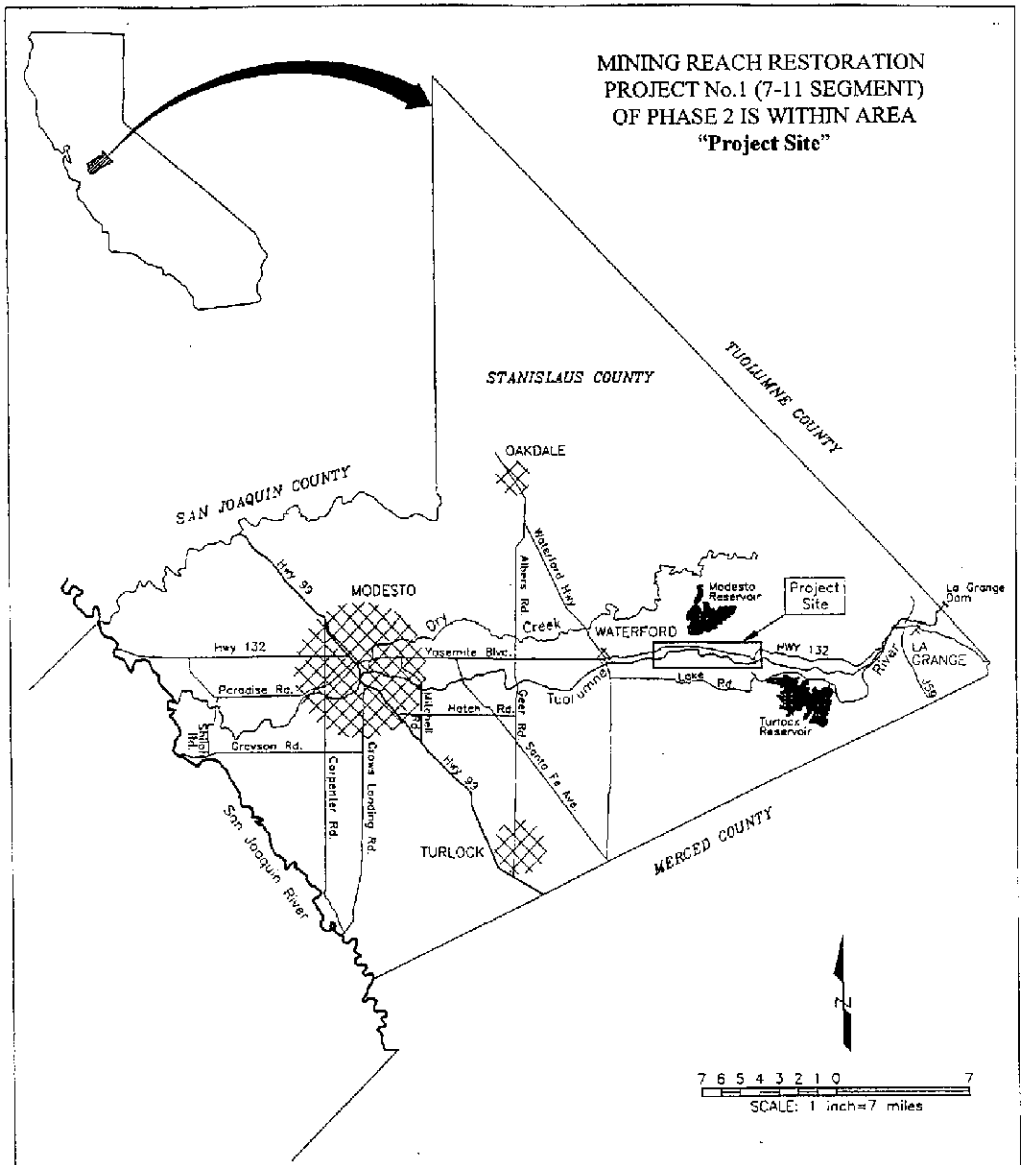

FIGURE 1. PROPOSED FLOODWAY DESIGN
TUOLUMNE RIVER MILE 34.2 TO 40.3

McBain & Trush 1997

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3. Reconstruct a natural river channel geometry scaled to current channel forming flows.
4. Restore native riparian plant communities within their predicted hydrological regime.

BACKGROUND & TECHNICAL JUSTIFICATION

The Tuolumne River is a major tributary of the San Joaquin River. The Don Pedro Project is the largest reservoir located above the fall-run chinook salmon spawning reach on the Tuolumne. Don Pedro Reservoir is owned by the TID and the ModID and is licensed by the Federal Energy Regulatory Commission (FERC).

The fall run chinook salmon in the tributaries of the San Joaquin River are currently listed as a species of concern by the USFWS. Anadromous salmonid populations in the lower Tuolumne River require adequate ecosystem health to achieve and sustain their potential productivity. Restoring and maintaining dynamic geomorphic processes are crucial for insuring healthy river ecosystems with natural productive salmonid populations. When complete restoration of a river ecosystem is infeasible, as for alluvial rivers regulated by dams, limiting factors, such as limited available spawning riffles and associated habitat and periodic entrapment of juvinile salmon in mining pits during high river flows, must be identified for prioritizing actions that would best improve the ecosystem, particularly salmonid habitat.

The TRTAC specifically identified habitat conditions to be improved to enhance natural salmon production in the Tuolumne River. The TRTAC is developing an integrated, long-term fish and riparian habitat restoration plan and monitoring program that utilizes adaptive management for enhancing the natural production of salmon. The TRTAC and the AFRP are each funding $105,000 towards developing this integrated restoration plan that will be completed in December 1997. The river has been divided into four reaches with 14 segments representing specific types of restoration projects within each reach. Some of these projects that focus on restoration of geomorphic processes, others for riparian restoration, and still others deal with gravel re-introduction and cleaning.

The Tuolumne River supports a population of fall-run chinook salmon, whose numbers have fluctuated from 40,000 fish in 1985, to a low of 100 fish in 1991, and is on another upward swing with 3,300 spawners in 1996. One of many stressors identified in recent studies on the Tuolumne River that limit salmonid populations is the aggregate extraction pits, which are a byproduct of extensive in-stream and off-channel mining. Many of these instream and off-channel pits have negatively impacted salmonid populations by stranding juveniles in ponds and fostering predator fish populations (bass). Additionally, spawning and rearing habitats have been negatively impacted by either complete removal during aggregate extraction, degradation by channel encroachment, or fine sediment infiltration. Many of the off-channel pits had a small topsoil berm separating them from the river. Common floods (e.g., 1983,1986,1995) of less than 11,000 cfs have breached some of these brims. Finally, the January 1997 flood (estimated at 59,000 cfs) breached nearly every berm in the Mining Reach, resulting in channel capture through the aggregate pits to the south of the 7-11 Aggregates plant (Figure 3) and breaching the berms at downstream aggregate pits (Figures 4 through 6). Aggregate miners have since completed emergency repairs to separate some of the ponds from the Tuolumne River and placed the river back into its pre-flood channel; however, most of these emergency repairs are only a

temporary solution.

The floods of January 1997 provided a unique opportunity during the develop Restoration Plan to design a 6.1 mile model riparian habitat floodway with a setback le system. The ecological benefits of a restored floodway, with increased flood capacity downstream of La Grange providing a long-term flood protection in this reach and cap more variable flood flow regime, presents an opportunity with common objectives amon irrigation districts, landowners, mining interests, and restorationists. The goal of this pr restore riparian habitats, salmonid habitats, and a continuous floodway through this si reach of the Tuolumne River. The objectives include:

1. Improve salmonid spawning and rearing habitats by restoring an alternate bar (p morphology, restoring spawning habitat within the meandering channel, and fi channel mining pits;
2. Improve juvinile salmon survival by preventing future connection between the River and off-channel mining pits;
3. Restore native riparian communities on appropriate geomorphic surfaces (i.e., channel and floodplain terraces) within the restored floodway;
4. Restore habitats for special status species (e.g., egrets, ospreys, herons);
5. Isolate off-channel aggregate extraction pits that were connected to the Tuolum by the January 1997 flood;
6. Restore a fully vegetated riparian floodway width that will safely convey flood 20,000 cfs;
7. Allow river channel the ability to migrate within the restored floodway to impro maintain riparian and salmonid habitat;
8. Remove floodway "bottlenecks" created by inadequate berms that are subject to threshold flows, thus protecting aggregate extraction operations and other huma structures from future flood damage.

PROPOSED SCOPE OF WORK

TASKS & SCHEDULES:

1.	Preliminary project design:	Completed
2.	CEQA, NEPA, & Permitting:	Aug 97 through De
3.	Civil design for Phase 1 construction:	Aug 97 through m
4.	Bidding on construction for Phase 1:	Mid Oct 97 to mid N
5.	Construction on Phase 1:	Mid Nov 97 through
6.	Bidding on revegetation for Phase 1:	Nov 97
7.	Revegetation for Phase 1:	Jan 98 through Feb
8.	Civil design for Phase 2 construction of 7-11 Segment:	Jan 98 through Ma
9.	Bidding on construction of 7-11 Segment in Phase 2:	Apr 98
10.	Construction of 7-11 Segment in Phase 2:	Jun 98 through Oct
11.	Bidding on revegetation of 7-11 Segment in Phase 2:	Oct 98
12.	Revegetation of 7-11 Segment in Phase 2:	Dec 98 through Fe

The reconstruction work in the river with heavy equipment is anticipated to be l

fishery reasons to an annual opportunity window of 90 working days from mid-June through September when the salmon are not as abundant in the river. The restoration plantings are also seasonally restricted to the winter months when planting materials are dormant. It is hoped that the agencies involved with the permitting will work with TID in meeting these operational restrictions. Construction design, revegetation design, and CEQA, NEPA and permitting will be done for the entire Mining Reach, but construction and revegetation funding will be requested for separate projects over a four-year period. The funding requests are divided along the different design, construction, and revegetation phases of the project for ease of tracking and administering differing funding sources.

Some of the levee and reconstruction materials will be mined from existing tailings deposits at the upstream end of the mining reach. One benefit of using the tailings is that those excavation areas can then be restored to provide additional flood plain habitat. Significant quantities of materials will be purchased from existing active mining areas on the back side of the setback levees to reduce haul costs. If most of the materials are locally available they can be hauled to the project site on private roads, so the impact on public roads may be minimized. The creation of setback levees using onsite materials may be an issue with SMARA because of this reduces remaining mining resources they previously had identified in this area. Additional materials for the major setback levees may need to be imported into the site. There are deposits of dredger tailings along the Tuolumne River and near Snelling along the Merced River. We will also utilize some of the clean rock materials from January 1997 flood debris excavated from La Grange reservoir. Alternatively, the material could come from active off channel and off site gravel mining areas between Geer Road and La Grange. The materials cost estimates are based on the local instream mining sources. If the restoration fill materials need to be hauled to the site over public roads, this will become one of the short term environmental concerns to be mitigated.

Creation of the riparian floodway habitat zone by the setback levees raises an issue of long term maintenance of project improvements. TID and ModID are looking into developing some form of locally administered conservation easement process that protects the public investment, but at the same time protects the land owner's property rights.

MONITORING PLAN

The monitoring plan can be grouped into three basic areas.

1. Physical habitat changes: Pre and post construction changes will be recorded from the as-built engineering drawings. This assures that the desired channel contours and cross sections were built as designed and these as-built records can be used to assess future geomorphological changes after major flood events.
2. Riparian habitat changes: Revegetation will require annual inspections during the first three years to confirm survival of planted materials, perform replanting if deemed necessary, and to assess natural changes in the vegetation mix. Monitoring vegetation would then be reduced to evaluations after significant flood events.
3. Fish population changes: This will involve evaluation of pre and post project changes in habitat conditions for both fish predators and salmon. Monitoring criteria would include items such as flow velocity, temperature, comparisons of

estimated transit time through the old vs new stream channel, combined with sampling observations of fish populations and spawning riffle conditions.

IMPLEMENTABILITY

This is the second of several restoration projects being proposed for the Tuolumne River based on the restoration plans being developed by the TRTAC. The staff is also working closely with the affected landowners in the development of site specific adjustments to the preliminary plans. A consultant will be hired to assist with the CEQA, NEPA, and permitting work. The NEPA work will be coordinated with the AFRP program NEPA documentation. Since these are environmental restoration projects, it is anticipated that FONSI and Mitigated Negative Declarations can be obtained.

A partial list of the anticipated permits and agencies to be dealt with is as follows: 404 Fill & Dredge Permit from the USCOE; 1600 Series Streambed Alteration Agreement from CDFG, a mining lease and Boundary Delineation finding from the State Lands Commission; an exemption from the SMARA permit by the CMGB; Stanislaus County use permit; RWQCB 401 waiver for water quality; and an Encroachment Permit from the Reclamation Board.

NOTE: The following four maps, Figures 3 through 6, show the four segments of the entire Mining Reach Project, with the 7-11 Reach (RM 37.6-40.3), the M. J. Ruddy Reach (RM 36.5-37.6), the Warner-Deardorff Reach (RM 35.1-36.5), and the Reed Reach (RM 34.2-35.1). At this time CALFED is only being asked to fund a portion of the Phase 2 work within the 7-11 Reach. The other three figures are included to show typical design and restoration treatments that are integrated within the whole Mining Reach.

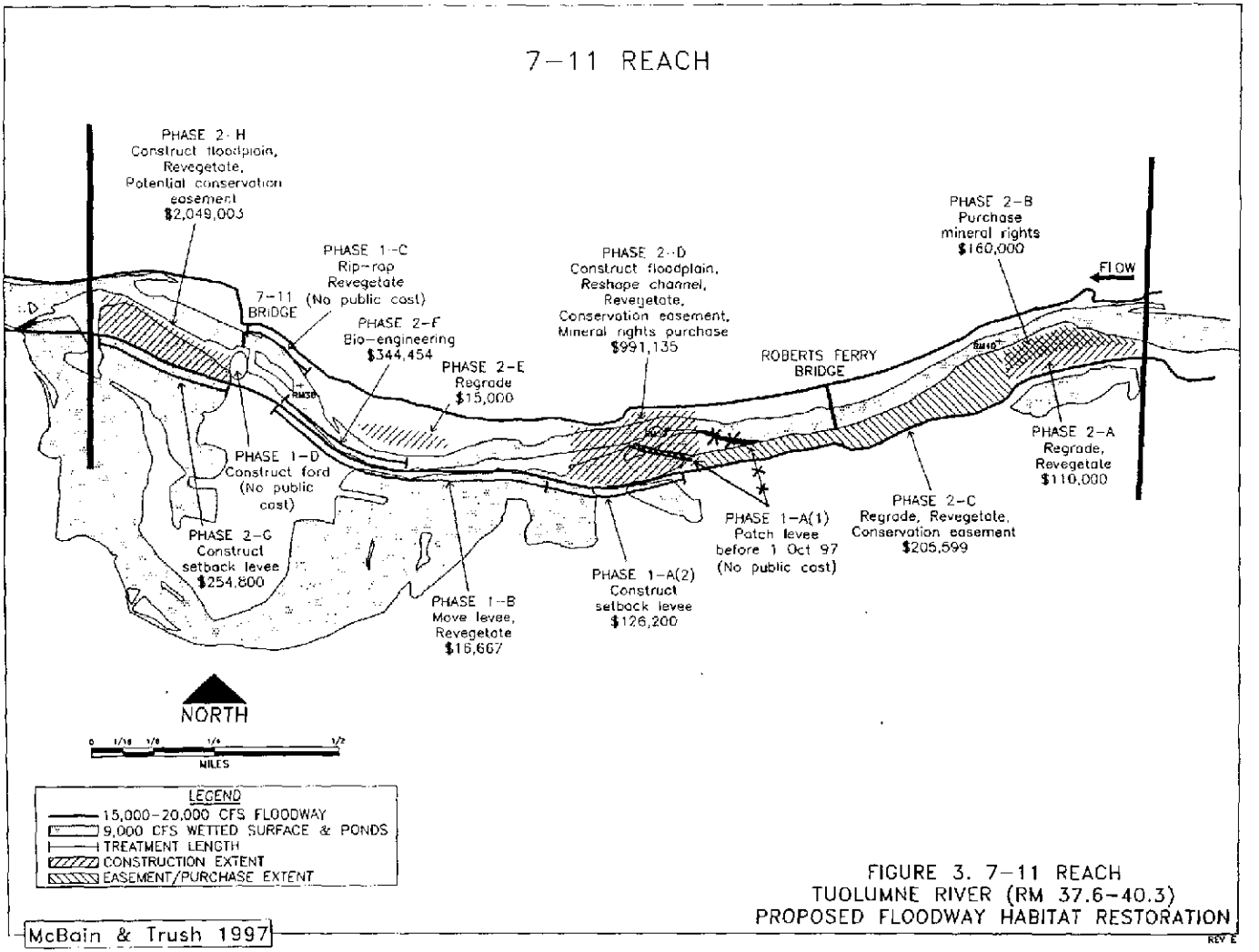

FIGURE 3. 7-11 REACH
TUOLUMNE RIVER (RM 37.6-40.3)
PROPOSED FLOODWAY HABITAT RESTORATION

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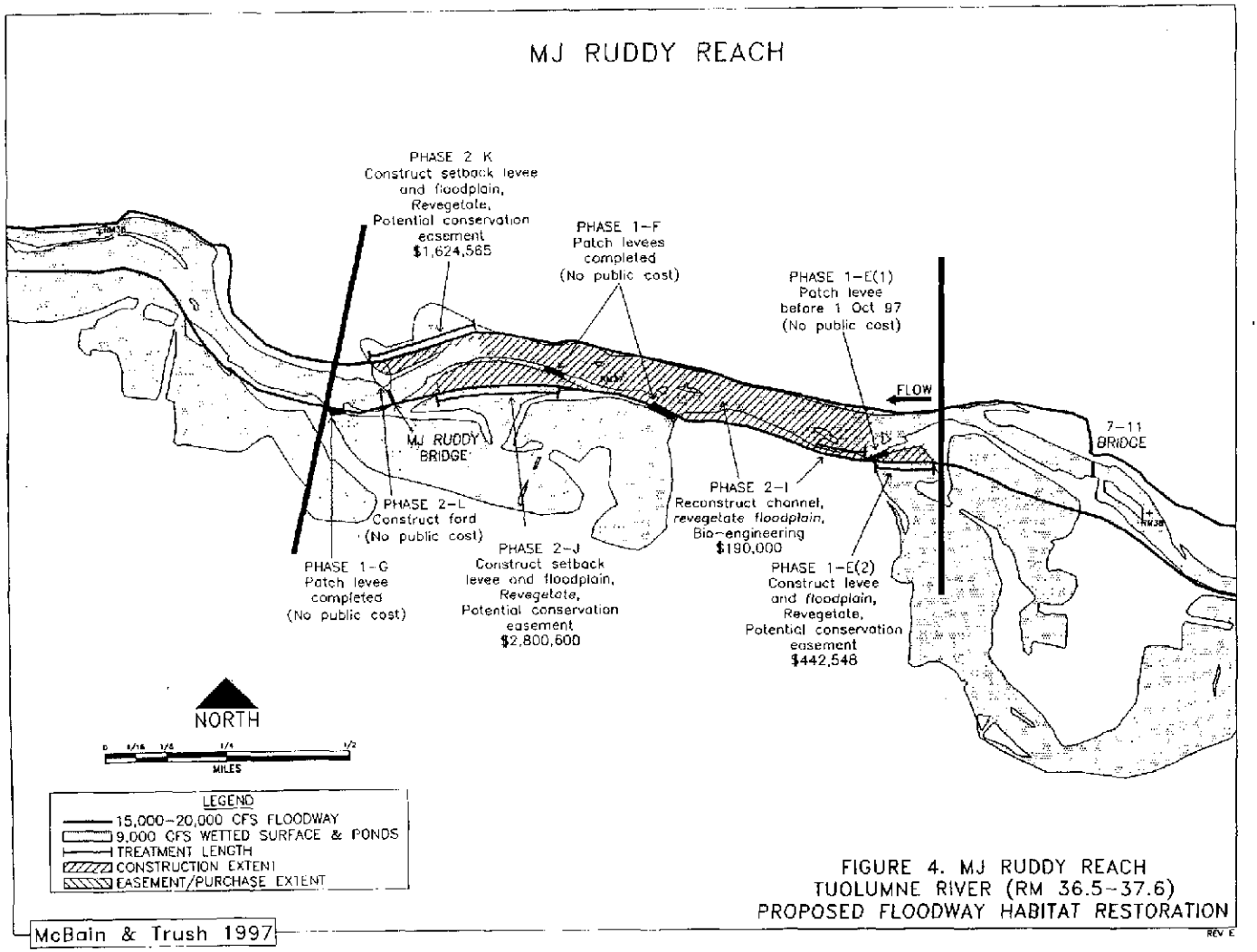

FIGURE 4. MJ RUDDY REACH
TUOLUMNE RIVER (RM 36.5-37.6)
PROPOSED FLOODWAY HABITAT RESTORATION

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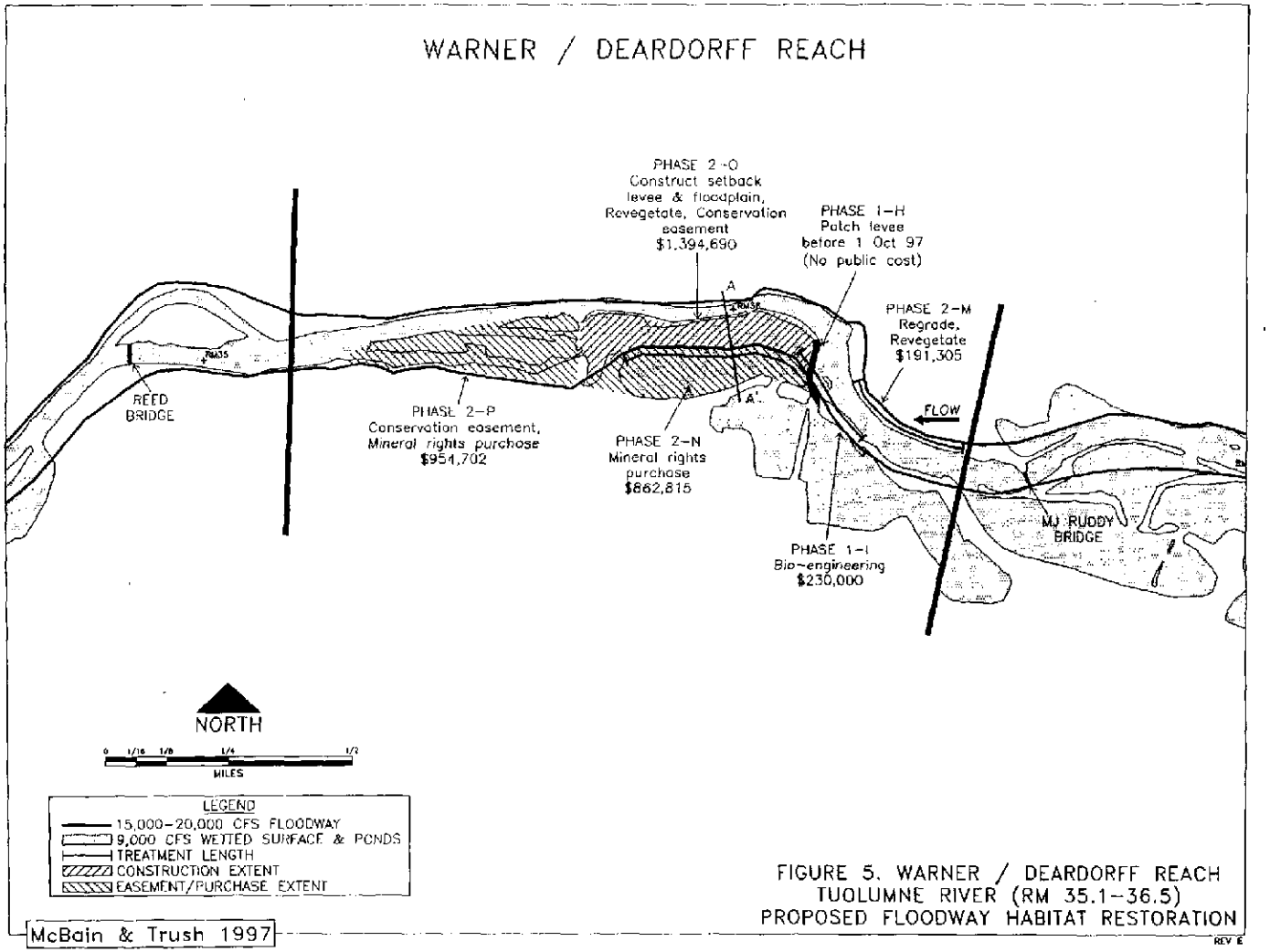

FIGURE 5. WARNER / DEARDORFF REACH
TUOLUMNE RIVER (RM 35.1-36.5)
PROPOSED FLOODWAY HABITAT RESTORATION

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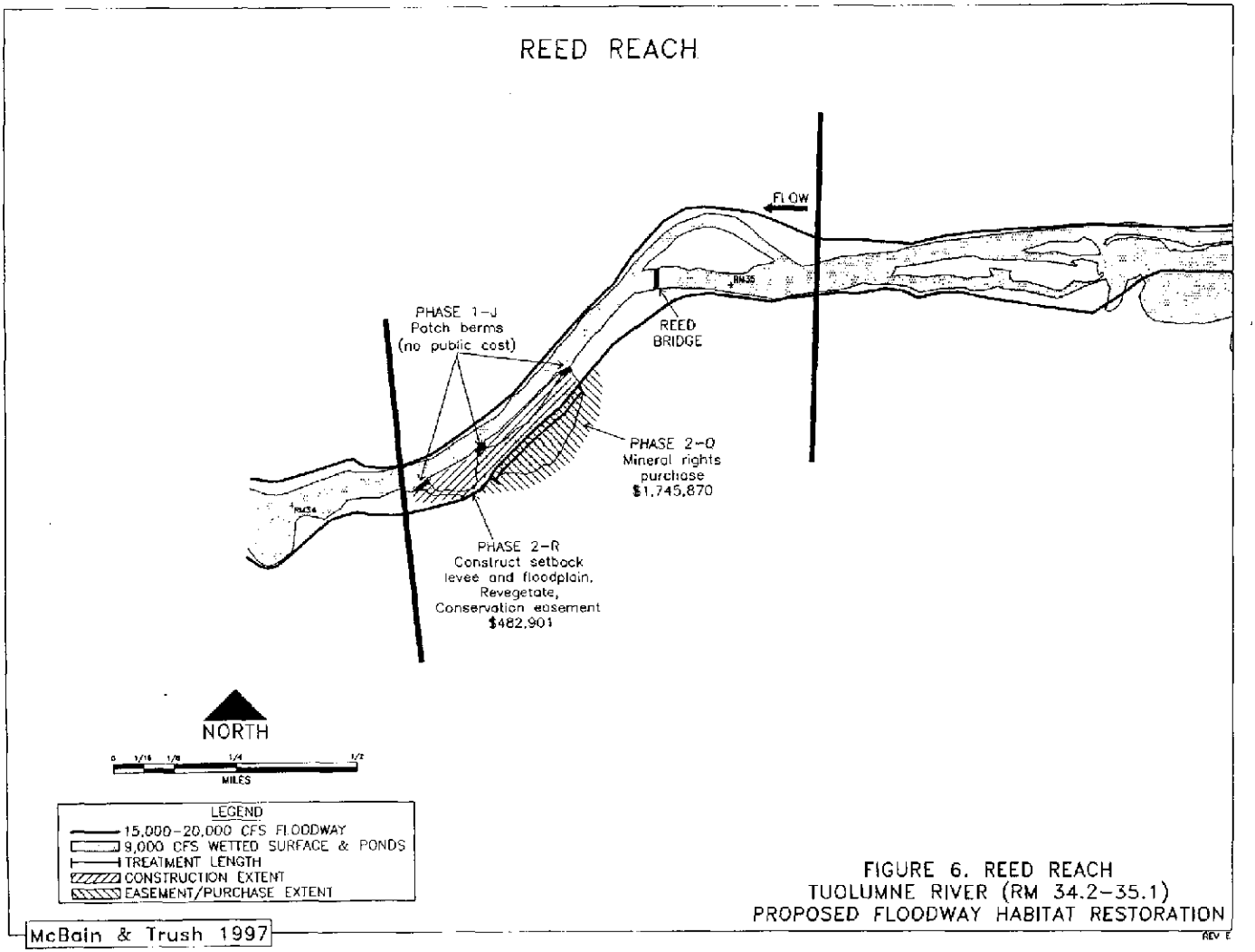

FIGURE 6. REED REACH
TUOLUMNE RIVER (RM 34.2-35.1)
PROPOSED FLOODWAY HABITAT RESTORATION

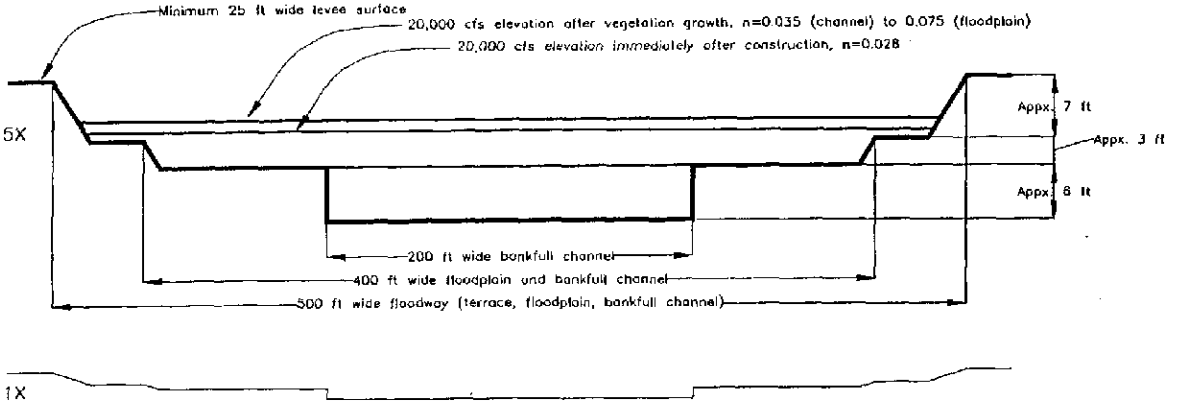

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FIGURE 7. SIMPLIFIED FLOODWAY DESIGN TRANSECT

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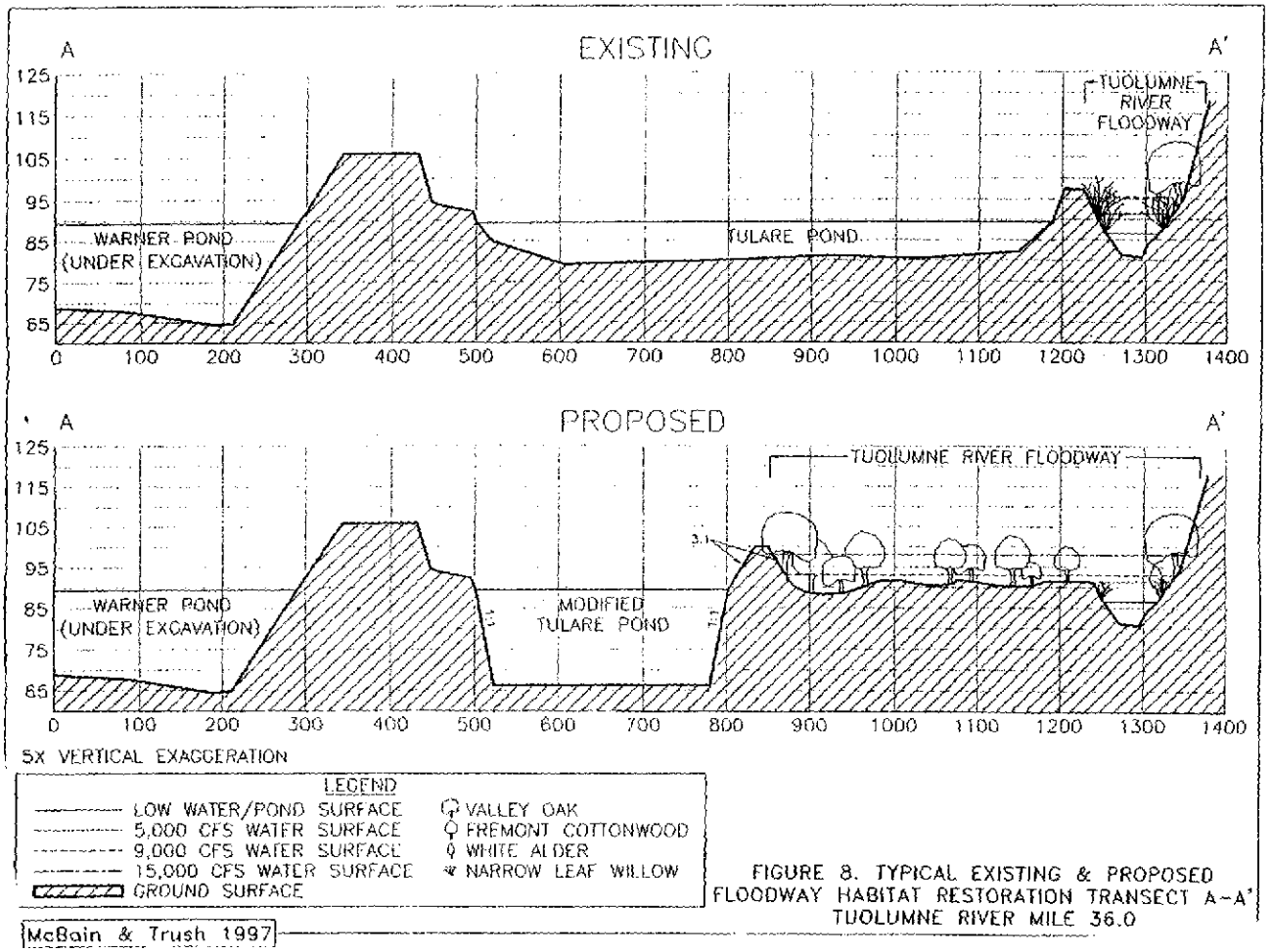

FIGURE 8. TYPICAL EXISTING & PROPOSED FLOODWAY HABITAT RESTORATION TRANSECT A-A' TUOLUMNE RIVER MILE 36.0

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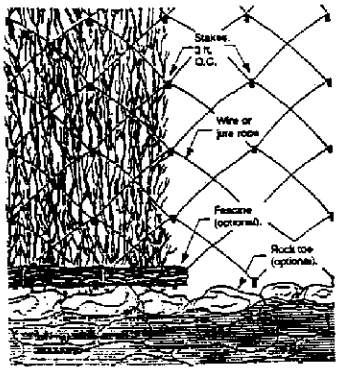
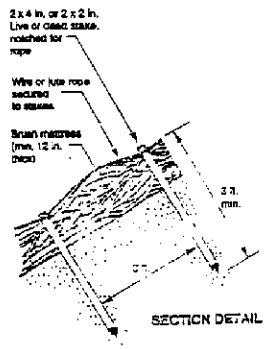
SALIX BRUSH MATTRESS

By King County Dept. of Public Works (1993), adapted from Gray & Leiser (1982)

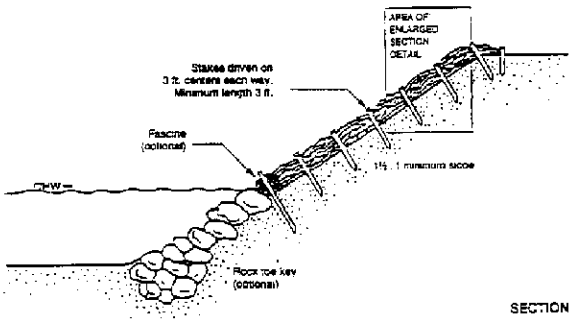


Note: Topsoil cover not shown.

ELEVATION



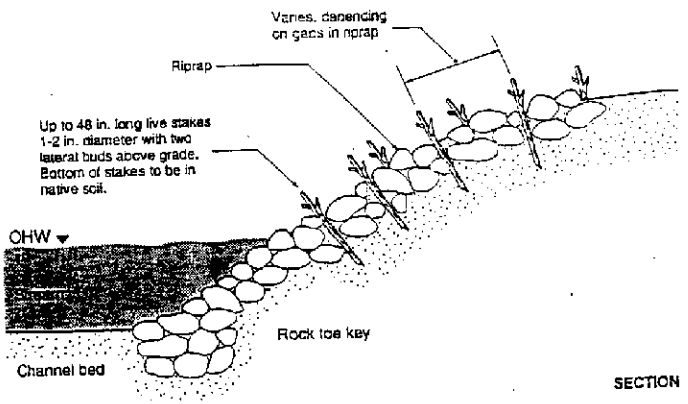
SECTION DETAIL



SECTION

SALIX/POPULUS JOINT PLANTING

By King County Dept. of Public Works (1993)



SECTION

FIGURE 9. TYPICAL BIO-ENGINEERING STRATEGIES

McBain & Trush 1997

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IV. COSTS AND SCHEDULES

BUDGET COSTS

The CALFED is being asked to fund some of the construction and revegetation c... of Project No. 1 (7-11 Segment) of Phase 2 of the overall Mining Reach project. The t... amount being requested from CALFED is $2,801,000, consisting of $160,000 to purchas... material, $15,000 to regrade the river channel, $254,800 for setback levee construction $2,049,000 for floodplain reconstruction, and $322,200 for project and construction management. The CEQA, NEPA, permitting, and construction design needed prior to ... plain reconstruction will be paid with cost share funds by TID, ModID, CCSF, and USF... AFRP. The USFWS-AFRP will also be asked to fund the balance the public works co...

TID has been coordinating with several different agencies to obtain funding for ... overall Mining Reach project. TID, ModID, and CCSF will provide $50,000 through th... TRTAC for CEQA, NEPA, and permitting. The USFWS through AFRP is being asked ... provide $3,382,000 spread over two of their fiscal years for pre- and post-project moni... construction design, revegetation, and portions of the public works construction separa... this CALFED request. A spreadsheet titled "AFRP- CALFED Matrix for 1997 & 1998 Funding" is attached showing the other anticipated funding sources, the periods of c... and associated project work for all the contributing agencies.

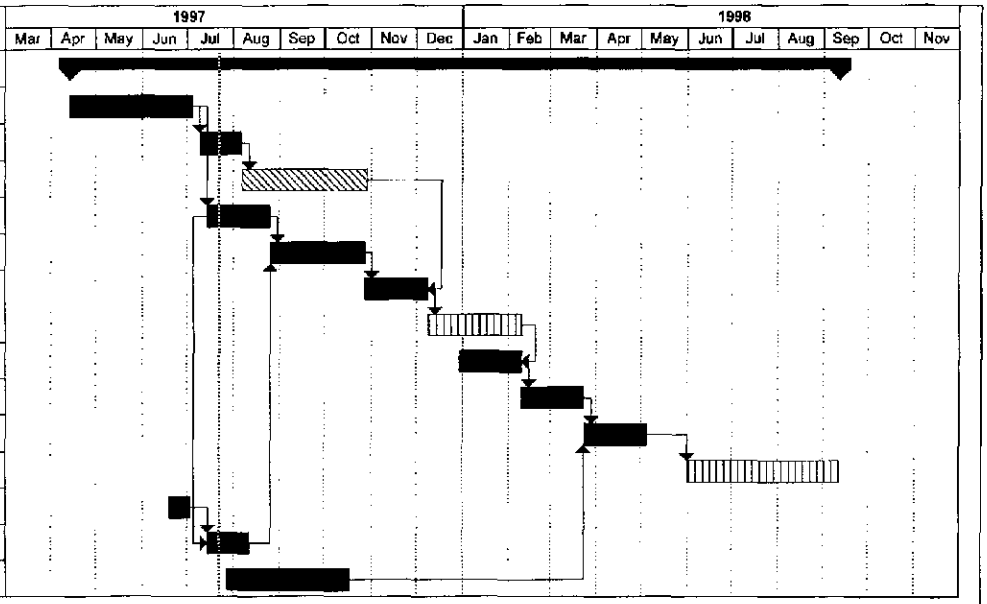
SCHEDULE

The schedule below shows all the work components even though CALFED is being asked to fund only public works in elements 9 through 12. AFRP funding will be utiliz... provide early assurance that Phase 1 CEQA, NEPA, permitting and civil design are c... construction can proceed on Phase 1 tasks.

1.	Preliminary project design:	Completed
2.	CEQA, NEPA, & permitting:	Aug 97 through ...
3.	Civil design for Phase 1 construction:	Aug 97 through m...
4.	Bidding on construction for Phase 1:	mid Oct 97 to mid N...
5.	Construction on Phase 1:	mid Nov 97 thro...
6.	Bidding on revegetation for Phase 1:	Nov 97
7.	Revegetation for Phase 1:	Jan 98 through Feb ...
8.	Civil design for Phase 2 construction of 7-11 Segment:	Jan 98 through Mar ...
9.	Bidding on construction of 7-11 Segment in Phase 2:	Apr 98
10.	Construction of 7-11 Segment in Phase 2:	Jun 98 through Oc...
11.	Bidding on revegetation of 7-11 Segment in Phase 2:	Oct 98
12.	Revegetation of 7-11 Segment in Phase 2:	Dec 98 through Feb ...

The attached Gantt charts shows the how the Phase 2 work in the Mining Rea... over the next four years, assuming continued AFRP and CALFED funding of future p...

ID	Task Name	Duration
1	MINING REACH PROJECT # 1	370d
2	MINING REACH DESIGN	60d
3	CONTRACT CEQA \ NEPA	20d
4	MINING CEQA & PERMITS	60d
5	CONTRACT CIVIL ENG	30d
6	CIVIL MINING SITE DESIGN	45d
7	LET CONTRACT # 1	30d
8	CONSTRUCTION 97	45d
9	LET REVEG CONTRACT # 1	30d
10	REVEG 98	30d
11	LET CONTRACT # 2	30d
12	CONSTRUCTION 98	75d
13	TRTAC FUNDING	10d
14	AFRP FUNDING	20d
15	CALFED FUNDING	60d



Project: RESTORATION PROGRAM
MINING REACH, PROJECT No. 1
Date: 7/22/97

Task
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Milestone
Rolled Up Progress

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Page 1

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I-002945

AFRP - CALFED Matrix For 1997 & 1998 Funding

USFWS fiscal year 1998 = Oct 97 to Sep 98
CALFED fiscal year 1998 = July 97 to Jun 98
TRTAC fiscal year 1998 = Jan 98 to Dec 98

24-Jul-97

Plan item	Phase # from design map	Funding period 1997	1998	months	Funding Source
Mining Reach No. 1 7/11 Segment					
Permitting for 97 work	P1	$50,000		Jul 97 - Dec 97	TID-MID-CCSF
Permitting for 98 work	P2	$75,000		Jul 97 - Sep 97	AFRP
Const. Design for 97	P1	$140,000		Jul 97 - Sep 97	AFRP
Const. Design for 98	P2		$320,000	Oct 97 - Mar 98	AFRP
Setback Levee	P1-A(2)		$126,000	Oct 97 - Dec 97	AFRP
Move Levee	P1-B		$17,000	Oct 97 - Dec 97	AFRP
Setback Levee	P1-E(2)		$442,600	Oct 97 - Dec 97	AFRP
Bio-engineering	P1-I		$230,000	Jan 98 - Mar 98	AFRP
Regrade Channel	P2-A		$110,000	Jul 98 - Sep 98	AFRP
Purchase Materials	P2-B		$160,000	Jul 98 - Sep 98	CALFED
Setback Levee	P2-D		$991,000	Jul 98 - Sep 98	AFRP
Regrade Channel	P2-E		$15,000	Jul 98 - Sep 98	CALFED
Setback Levee	P2-G		$254,800	Jul 98 - Sep 98	CALFED
Construct Floodplain	P2-H		$2,049,000	Jul 98 - Sep 98	CALFED
Bio-engineering	P2-C		$205,600	Jan 98 - Mar 98	AFRP
Bio-engineering	P2-F		$344,500	Jan 98 - Mar 98	AFRP
Project & Const. Mgt.	13 %		$322,200	Jan 98 - Mar 98	CALFED
Project & Const. Mgt.	13 %	$18,000	$362,300	Jan 98 - Sep 98	AFRP
	sub totals	$283,000	$5,950,000		
	TOTALS	$233,000	$3,149,000	$3,382,000	AFRP
		$0	$2,801,000	$2,801,000	CALFED
		$50,000	$0	$50,000	TID-MID-CCSF

THIRD PARTY IMPACTS

The parties most directly impacted by the proposed project are the local landowners and the aggregate mining operators. As described in Part V below, TID staff and consultants have been and will continue to meet with the affected stakeholders to listen to and address their individual concerns. Recognizing those individual concerns, the landowners and the mining operators have been cooperative and supportive of the project.

If materials for the major setback levees must be transported by truck to the project site from outside the immediate area, then there are potential third party impacts to persons and properties adjoining the roads over which the materials need to be hauled. Possible impacts from excavation of the materials would be addressed in the applicable County/SMARA permits for each aggregate mining site.

V. APPLICANT QUALIFICATIONS *(3 w/tables)*

Since 1971, TID, ModID, and CCSF have, in cooperation with DFG and USFWS, monitored river conditions and developed programs that enhance the natural production of fall-run chinook salmon in the Tuolumne River. The project manager for these activities has been TID.

TRTAC and Other Local Support for Project

Before the January 1997 flood, McBain & Trush had been retained by TID through the TRTAC to develop an integrated, long-term fish and riparian habitat restoration plan for the Tuolumne River below La Grange Dam and to prepare preliminary designs for specific restoration projects which had been approved by the TRTAC participants as high priority projects. The Mining Reach had long been identified as a portion of the river that had been substantially altered by past and present aggregate mining operations. In the aftermath of the January 1997 flood, the TRTAC participants identified the flood-impacted Mining Reach as an important time-sensitive opportunity to reconstruct this portion of river channel so as to restore more natural geomorphic processes.

Primary project design work for the Mining Reach was done by McBain & Thrush. The TRTAC gave its support for this major restoration at its March 13, 1997. Congressman Gary Condit's office hosted a meeting of representatives from the TRTAC participants, state and federal agencies (including CALFED staff), aggregate mining operators, and landowners (hereafter referred to as the "Mining Reach stakeholders") in Modesto on April 3. This was followed by a meeting with the affected landowners on April 10 in Waterford and another Mining Reach stakeholders meeting on April 21. At its May 21 meeting, the TRTAC authorized contributing $50,000 for Phase 1 permitting. Coordination activities will continue with the Mining Reach stakeholders. Recognizing individual concerns about the project, the aggregate mining operators and landowners have been cooperative and supportive of the project.

Project Management

The enclosed table shows the planned organization of TID staff, consultants, and other resources to be used in implementing this project.

The Project Manager is Wilton Fryer, P.E. Mr. Fryer graduated from the University of California at Davis with a B.S. in Soil & Water Science, an M.S. in Irrigation Science, and later an M.E. in Civil Engineering with an emphasis in water resources. He is currently registered as both a Civil Engineer and an Agricultural Engineer. Accomplishments are: development and implementation of the Oakdale Irrigation District Irrigation Master Plan; directed a $22 million canal rehabilitation project for OID where 54 miles of dirt canals were replaced with pipe; development of the OID domestic water service system; designer and project manager for a replacement water treatment plant for the La Grange Domestic Water System..

Mr. Fryer will be assisted by Tim Ford, staff aquatic biologist for TID and ModID since 1981. Mr. Ford graduated from the University of California at Davis with a B.S. in Wildlife &

Fisheries Biology in 1977. He worked as a Biological Technician for the Modoc, Tahoe, and Stanislaus National Forests prior to working for the districts. Mr Ford is tasked with planning, coordinating and conducting the aquatic resources program for the districts, and his responsibilities at TID include field studies, program development, consultant supervision, and coordination with Don Pedro project operations.

Contracting support and financial service support as needed will be provided by TID staff.

Qualified consultants will be retained to perform the CEQA and NEPA environmental work and to obtain necessary permits and easements. TID has issued a request for proposals for this work.

TID Engineering will provide construction management and inspection services to the project. It is anticipated that a licensed professional civil engineer will be assigned to perform these duties.

For ease of coordination and verification of on-site conditions, it is anticipated that a local qualified consulting engineering firm will be retained to prepare the civil construction design work.

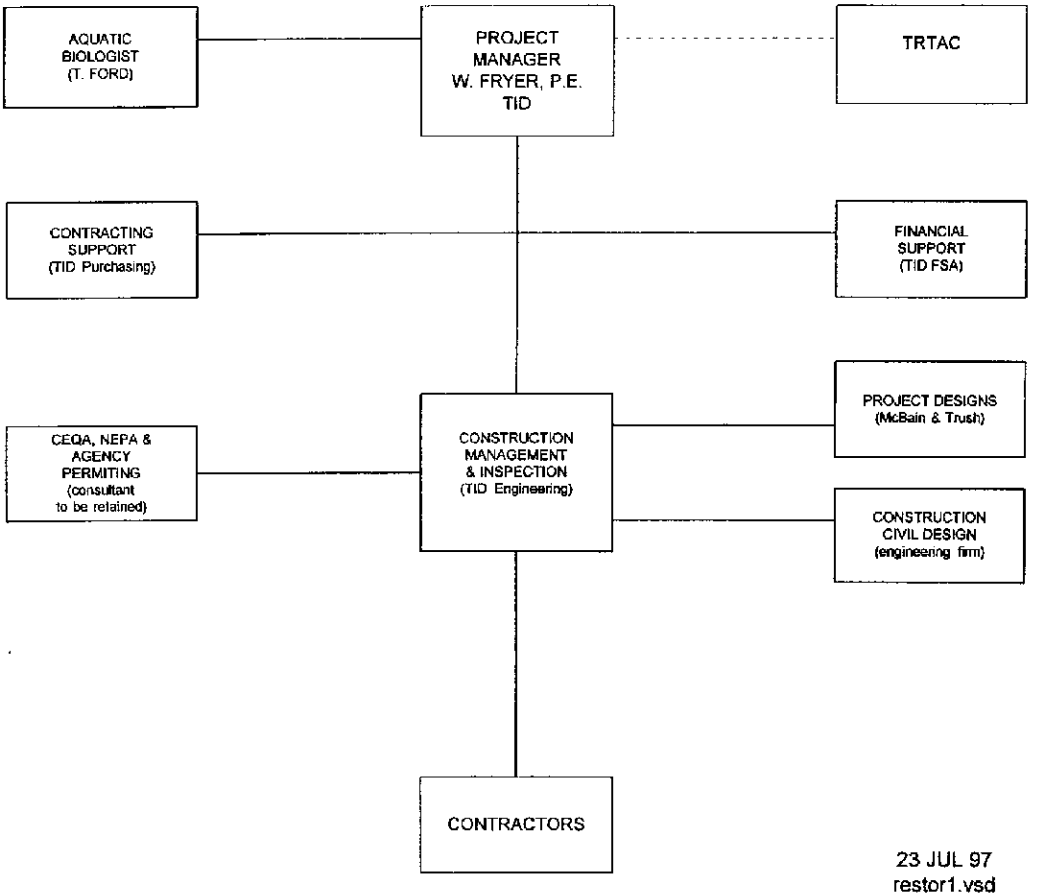
Project design work has been performed by the firm of McBain & Trush, who will continue to provide oversight of the civil construction design work and revegetation design and implementation. McBain & Trush is a professional consulting partnership specializing in applying fluvial geomorphic and ecological research to river management and restoration, particularly in regulated river ecosystems. The principals on this project are Scott McBain, Dr. William Trush, and John Bair.

Scott McBain is a hydraulic engineer and fluvial geomorphologist with a M.S. in Civil Engineering from the University of California at Berkeley. He specializes in effects of high stream flows on channel morphology, bedload transport, watershed sediment yields, and stream restoration

Dr. William Trush is an adjunct professor in the Humboldt State University Fisheries Department, specializing in anadromous fish ecology, anadromous fish interactions with fluvial geomorphology, channel maintenance flows and hydrology, riparian ecology, and stream restoration and management. He is also Director of the HSU Institute for River Ecosystems.

John Bair is a riparian botanist with a M.S. in Environmental Systems form Humboldt State University. He specializes in riparian interactions with geomorphic processes and riparian restoration.

TUOLUMNE RIVER RESTORATION
PROJECTS



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VI. COMPLIANCE WITH STANDARD TERMS & CONDITIONS

Applicant is a public entity. The applicable RFP project group type is Group 1, Public Works Construction.

The applicant agrees to the terms and conditions of the Request for Proposals as amended by CALFED's Responses to RFP Questions dated 14 July 1997, and applicant intends to comply with those terms and conditions.

It is anticipated that a majority of the public works construction effort will be performed by private contractors. Pursuant to Question and Response 25 of the above CALFED Responses, the applicant will be deferring the requirement for submission of bid & payment bonds until such time as each subcontract is sought and awarded and before any work under the subcontract is performed.

Enclosed are the following completed formes:

Nondiscrimination Compliance Statement, RFP Item No. 8
Noncollusion Affidavit - Public Works, RFP Item No. 11

Submitted by:

TURLOCK IRRIGATION DISTRICT

By _____
Paul D. Elias, General Manager

Date: 28 July 1997

Item 8

NONDISCRIMINATION COMPLIANCE STATEMENT

COMPANY NAME
Turlock Irrigation District

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below, hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California.

OFFICIAL'S NAME
Paul D. Elias

DATE EXECUTED
July 28, 1997

EXECUTED IN THE COUNTY OF
Stanislaus

PROSPECTIVE CONTRACTOR'S SIGNATURE

PROSPECTIVE CONTRACTOR'S TITLE
General Manager

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME
Turlock Irrigation District

Item 11

Agreement No. _____

Exhibit _____

NONCOLLUSION AFFIDAVIT TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID FOR PUBLIC WORKS

STATE OF CALIFORNIA)

)ss

COUNTY OF Stanislaus)

Paul D. Elias, being first duly sworn, deposes and
(name)

says that he or she is General Manager of
(position title)

Turlock Irrigation District
(the bidder)

the party making the foregoing bid that the bid is not made in the interest of, or on behalf of, any undisclosed person, partnership, company, association, organization, or corporation; that the bid is genuine and not collusive or sham; that the bidder has not directly or indirectly induced or solicited any other bidder to put in a false sham bid, and has not directly or indirectly colluded, conspired, connived, or agreed with any bidder or anyone else to put in a sham bid, or that anyone shall refrain from bidding; that the bidder has not in any manner, directly or indirectly, sought by agreement, communication, or conference with anyone to fix the bid price of the bidder or any other bidder, or to fix any overhead, profit, or cost element of the bid price, or of that of any other bidder, or to secure any advantage against the public body awarding the contract of anyone interested in the proposed contract; that all statements contained in the bid are true; and, further, that the bidder has not, directly or indirectly, submitted his or her bid price or any breakdown thereof, or the contents thereof, or divulged information or data relative thereto, or paid, and will not pay, any fee to any corporation, partnership, company, association, organization, bid depository, or to any member or agent thereof to effectuate a collusive or sham bid.

DATED: 28 July 97 By _____
(person signing for bidder)

GAIL HUMPHREY
Comm. # 1109009
NOTARY PUBLIC - CALIFORNIA
Stanislaus County
My Comm. Expires Aug. 16, 2000

(Notarial Seal)

Subscribed and sworn to before me on

July 28, 1997

Gail Humphrey
(Notary Public)

FI-136
Reference

TUOLUMNE RIVER FLOODWAY EMERGENCY REPAIR AND LONG-TERM HABITAT RESTORATION PROJECT PROPOSAL

7-11 Materials, Santa Fe Aggregates, and Reed Gravel Mining Reach, Stanislaus County, River Mile 34.2 to 40.3

Prepared for:

Tuolumne River Technical Advisory Committee
(Don Pedro Project, FERC License No. 2299)
and
Tuolumne River Stakeholders Group

July 17, 1997

Prepared by:

McBain and Trush
P.O. Box 663
824 L Street, Studio 5
Arcata, CA 95521
(707) 826-7794

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INTRODUCTION

The January 1997 flood event on the Tuolumne River, with an unregulated peak magnitude estimated at 130,000 cfs, was the largest flood since the legendary flood of 1862. The flood release from New Don Pedro Reservoir peaked at nearly 60,000 cfs on January 3 (higher flows have occurred prior to construction of New Don Pedro). While some damage to the floodway occurred in reaches relatively undisturbed by human land use, reaches with extensive land use (urban encroachment, aggregate extraction, sewage treatment plants, bridges) were much more heavily damaged. One of these heavily damaged reaches was the aggregate extraction reach upstream of Waterford.

The aggregate industry, stakeholders and representatives of potential funding sources, including CALFED, met in Modesto on April 3, 1997 to discuss long-term habitat restoration and funding options. This document attempts to better illustrate the scope, approach, and cost of restoring habitat and creating an adequate floodway through this six-mile reach of the Tuolumne River as requested at the 3 April 1997 meeting. An initial meeting with landowners was held on 10 April 1997 to discuss the proposed concept. A follow-up meeting to the 3 April meeting was held in Modesto on 21 April at the Modesto Irrigation District (MID) office. Due to the complexities of many landowners, lease agreements with individual aggregate miners, preliminary topographical information, unconfirmed sources for restoration materials (vegetation, aggregate, and topsoil), and the short time frame provided for this analysis, the cost estimates and details should be considered provisional. Some of the specifics described below may change as discussions progress. Currently, the lead agency for this project has not been formally identified; however, Turlock Irrigation District (TID) has been acting in this role. There will be many agencies actively participating in this project, along with the local aggregate companies and landowners.

BACKGROUND

The Tuolumne River, one of the three main tributaries of the San Joaquin River, is typical of most central valley rivers that drain the west slope of the Sierra Nevada (Figure 1). It has an extensive history of gold mining, municipal and agricultural water storage, power generation, agriculture, and recreation. The river channel upstream of river mile 25 (Geer Road) has had two major legacies of disturbance. From the 1850's to the 1950's, extensive placer and dredger mining for gold occurred from La Grange (river mile 51) to below Roberts Ferry Bridge (river mile 37.5). Much of the gravel spoils (tailings) from these gold mining activities were removed in the late 1960's for constructing the New Don Pedro Dam project. Large scale aggregate mining (sand and gravel) began in this reach in the 1940's, first with instream mining, then later with floodplain/terrace pit mining that continues today. This activity not only caused mounds of dredger tailings and deep pits, but also removed riparian vegetation and reduced the width of the Tuolumne River riparian corridor (Figure 2). The reduction in riparian corridor width was greatest in the aggregate extraction reach (Table 1.)

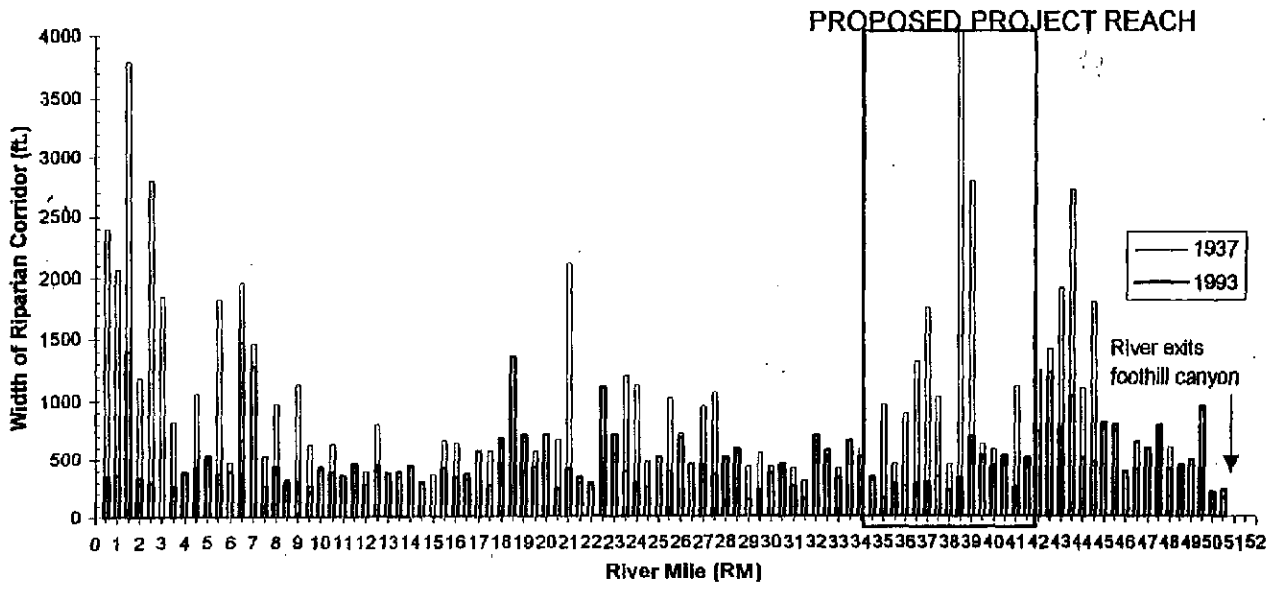

Figure 2 Riparian corridor widths from 1937 and 1993 aerial photographs at half mile intervals, beginning at the Tuolumne River confluence with the San Joaquin River (RM 0) and ending just upstream of the new La Grange bridge (RM 51.5). The Tuolumne River riparian corridor was already significantly altered in 1937 by gold dredging, agricultural and urban encroachment).

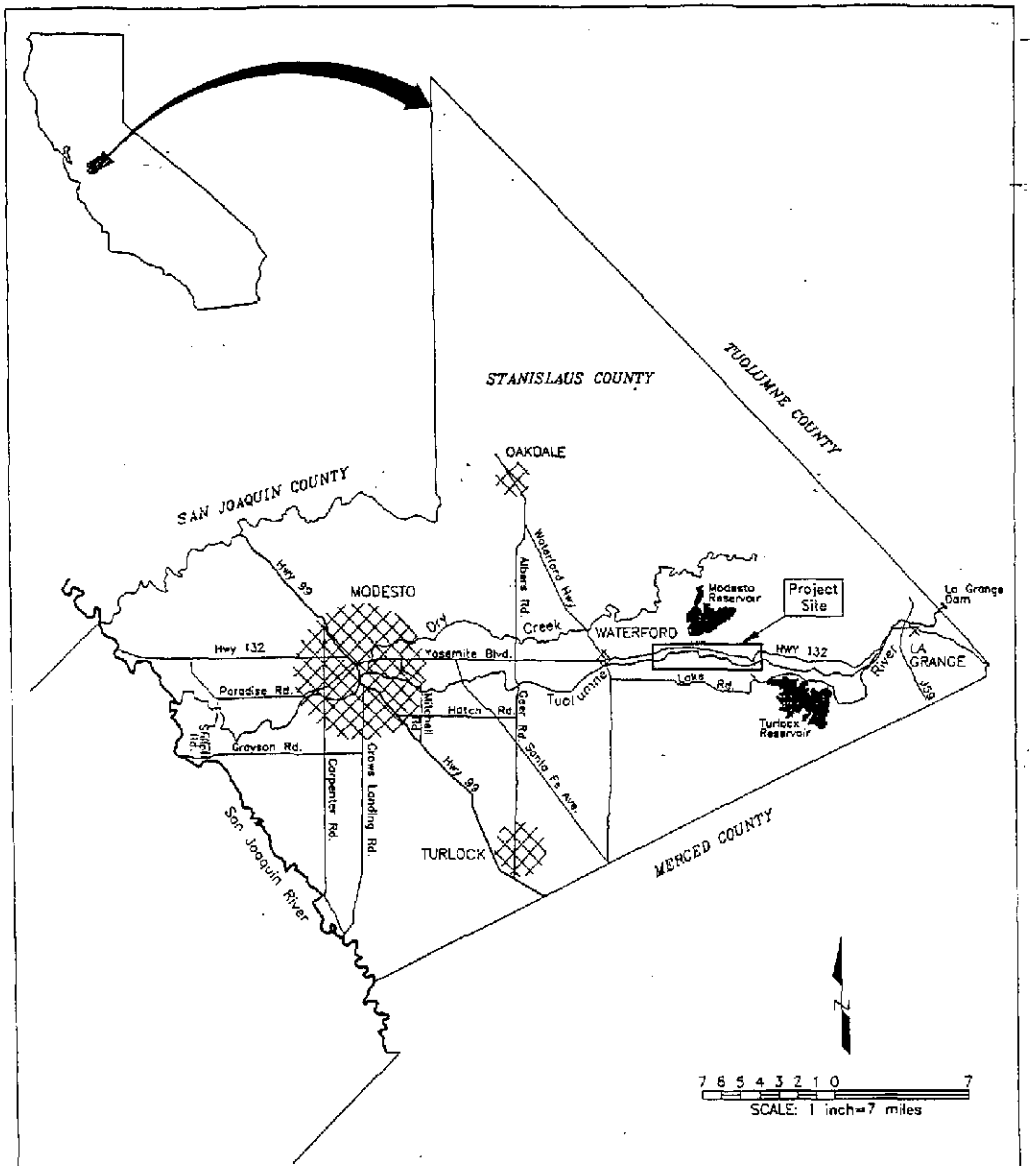

FIGURE 1. PROPOSED FLOODWAY DESIGN
TUOLUMNE RIVER MILE 34.2 TO 40.3

McBain & Trush 1997

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Table 1: Riparian corridor width descriptive statistics for river mile 33.5 to river mile 40.5

	1993 Riparian Corridor Width	1937 Riparian Corridor Width
Mean width	387.8 feet	1100 feet
Median width	336 feet	620 feet
Maximum width	686 feet	4000 feet
Minimum width	164.5 feet	310 feet

The Tuolumne River also supports a population of fall-run chinook salmon, whose numbers have fluctuated from 40,000 fish in 1985, to a low of 100 fish in 1991, and is on another upward swing with 3,300 spawners in 1996. One of many stressors identified in recent studies on the Tuolumne River that limit salmonid populations is the aggregate extraction pits, which are a byproduct of extensive in-stream and off-channel mining. Many of these instream and off-channel pits have negatively impacted salmonid populations by stranding juveniles in ponds and fostering predator populations (bass). Additionally, spawning and rearing habitats have been negatively impacted by either complete removal during the aggregate extraction, degradation by channel encroachment, or fine sediment infiltration. Many of the off channel pits had a small topsoil berm separating them from the river. Common floods (e.g., 1983, 1986, 1995) of less than 11,000 cfs have breached some of these berms. Finally, the January 1997 flood (estimated at 59,000 cfs) breached nearly every berm in the reach, resulting in a channel capture through aggregate pits to the south of the 7/11 Aggregates plant (Figure 3) and breaching of berms at downstream aggregate pits (Figures 4 through 6). Aggregate miners have since completed emergency repairs to separate some of the ponds from the Tuolumne River and place the river back into its pre-flood channel; however, most of these emergency repairs are only a temporary solution.

The Turlock and Modesto Irrigation Districts are urging the Army Corps of Engineers to increase the allowable flood release from the present 9,000 cfs to 20,000 cfs at Modesto to improve flood management. This will require further upgrades of levees/berms in this reach. Rather than rebuild these berms/levees in their pre-flood location and height, which in many cases are already known to be inadequate, we propose a program of partnership with the aggregate miners and other entities to rebuild the berms as setback levees, creating a riparian floodway with a minimum width of 500 to 600 feet. This floodway width should safely convey discharges of 15,000 to 20,000 cfs with fully grown riparian vegetation and a reasonable safety factor (Figures 7 and 8). Existing reaches with greater width would be maintained as additional floodway/habitat areas.

The ecological benefits of a restored floodway, increased floodway capacity downstream of La Grange, long-term flood protection in this reach, and more variable flood flow

regime, presents a unique opportunity of common objectives among the irrigation districts, landowners, mining interests, and restorationists.

OBJECTIVES

The goal of this project is to restore riparian habitats, salmonid habitats, and a continuous floodway through this six-mile reach of the Tuolumne River. Objectives include:

1. Improve salmonid spawning and rearing habitats by restoring an alternate bar (pool-riffle) morphology, restoring spawning habitat within the meandering channel, and filling in-channel mining pits
2. Improve juvenile salmonid survival by preventing future connection between the Tuolumne River and off-channel mining pits
3. Restore native riparian communities on appropriate geomorphic surfaces (i.e., active channel, floodplains, terraces) within the restored floodway
4. Restore habitats for special status species (e.g., egrets, ospreys, herons)
5. Isolate off channel aggregate extraction pits that were connected to the Tuolumne River by the January 1997 flood
6. Restore a floodway width that will safely convey floods up to 20,000 cfs
7. Allow channel ability to migrate within restored floodway to improve and maintain riparian and salmonid habitat
8. Remove floodway "bottleneck" created by inadequate berms have caused (e.g., berm failure above a certain discharge threshold)
9. Protect aggregate extraction operations, bridges, and other human structures from future flood damage

APPROACH

The proposed approach attempts to restore a functional floodway through this impacted reach by constructing setback levees. These levees, constructed at least 500 feet apart, would define the long-term riverine and riparian corridor for the Tuolumne River. The long-term viability of this corridor would be preserved by landowners, or with a combination of land purchases (most likely in pond areas) and riparian conservation easements (in un-mined areas adjacent to the river). The post-dam low water channel width is approximately 100 feet, and the present post-dam bankfull channel width (the channel below the floodplain elevation) is approximately 200 feet. With this proposal, the resulting floodplain/terrace width would be a minimum of 300 feet, for a total combined minimum floodway width of 500 feet (Figures 7 and 8). This would allow room for the channel to migrate within the floodplain without capturing aggregate mining pits and destroying human structures.

Due to the large scale of the project, completion will take at least 2 to 3 years. Therefore, we propose to implement the project in two phases. The first phase targets immediate needs, including replacing destroyed berm/levees as setback levees (as opposed to reconstructing them in the pre-flood location), bioengineering bank protection (as opposed to rip-rap, Figure 9), and revegetation with native woody riparian species. The second phase would remove most narrowing berms and replace them with setback levees, restore

former floodplains by filling portions of mining pits, reconstruct portions of the low water channel to a more natural morphology, and revegetate floodplains with native woody riparian species (Figure 8).

The proposed activity includes State and Federal cost-sharing with the aggregate miners, most of which would occur in Phase 1. The aggregate miners have legal responsibility to maintain the berms as part of their permitted operations, thus it is proposed to apply that responsibility to replacing the berms as setback levees. Public moneys would be applied to constructing setback levees in areas where berms/levees were not destroyed, rebuilding floodplains and low water channels, and riparian revegetation. A primary benefit of the project is to remove the floodway "bottleneck" created from the berms left by aggregate extraction operations. Planning is underway to remove urban bottlenecks near Modesto to convey flows up to 20,000 cfs, so restoring a floodway in this reach would remove another hurdle for facilitating a higher flood flow regime. Other project benefits include:

- restores a riparian floodway corridor that is sized to the post-dam flow regime (Figures 7 and 8)
- restores bankfull channel and floodplain sized to the post-dam flow regime (Figures 7 and 8)
- restores a continuous riparian corridor (by revegetating barren banks and connecting fragmented riparian stands) (Figures 3-6)
- restores large areas of cottonwood and valley oak communities that existed historically, providing critical perching, roosting, and nesting habitat for raptors, egrets, and herons (Figures 7 and 8)
- increases channel flood flow storage and accommodates future flood flow releases
- restores a pool-riffle morphology, encouraging a greater diversity in instream habitats (particularly salmonid habitats)
- enables the channel to migrate through floodplains and terraces, discouraging levee erosion during any single high flow event
- protection from future channel capture and river-to-pit connection during high flows
- decrease in chinook salmon mortality from stranding and bass predation
- improved chinook salmon rearing and spawning habitat
- increased riparian corridor width will improve wildlife migration corridor and increase the aerial extent of wildlife habitat

REACH AND PRIORITY DELINEATION, PROJECT DESCRIPTION

The objective of Phase 1 items are to eliminate flow and salmonid access to mining pits during periods of high flow. The timeline for CALFED funding (see below) could require construction when adult chinook salmon are migrating upstream and spawning. In-channel construction phases would have to commence after smolt outmigration (June 15) and be completed by the start of adult migration (September 30). Thus, this project is phased to minimize disturbance to salmonids and implement time sensitive portions of the project first (e.g., isolating ponds from the river). Cost sharing has been discussed with the aggregate miners in the reach, and results of these discussions are used in the budget estimates below. Based on regulatory conditions in their permits, certain tasks, such as

maintenance of a 9,000 to 11,000 cfs floodway, are their responsibility to implement and constitute portions of industry cost-sharing. Based on this interpretation of the aggregate industry's responsibilities, and discussions with them regarding their reconstruction plans, the anticipated funding source for each task is represented as follows: "PUBLIC" represents public funding sources (e.g., AFRP), and "7/11", "SANTA FE", and "REED" represent anticipated respective aggregate industry responsibility. "Native woody riparian species" includes several willow species on lower gravel bar surfaces, white alders and boxelders at the edges of the active channel, cottonwoods and black willow on floodplain surfaces, and valley oak on floodplain/terrace surfaces.

The six miles of this project has been divided into four reaches: 7/11 reach, Ruddy reach, Warner/Deardorff reach, and the Reed reach. These delineations were created based on land ownership and sphere of influence of the aggregate extraction operations.

7/11 REACH

This reach is defined by the extent of 7/11 aggregate extraction upstream of Roberts Ferry bridge (river mile 40.3) downstream to the M.J. Ruddy property line below the 7/11 plant site (river mile 37.7) (Figure 3). Impact of the 1997 flood included channel capture through aggregate ponds to the south of the 7/11 plant site (river mile 39 to 37.6), river capture of the 7/11 settling pond near the haul road bridge (river mile 37.9), and damage to berms/levees upstream of the 7/11 plant site (river mile 38.1 to 38.6).

Phase 1

A. Build setback levee/haul road on south bank from river mile 38.8 to 39.1 (preventing pond connection by flows up to 15,000 to 20,000 cfs) and revegetate toe of levee (cost-sharing: PUBLIC and 7/11 expense)
B. Upgrade existing south bank levee upstream of 7/11 plant site at river mile 38.1 to 38.7 by moving haul road south approximately 25 feet and building a small terrace on river side of haul road (cost-sharing: PUBLIC and 7/11 expense)
C. Extend rip-rap toe on north bank of river at haul road bridge upstream 300 feet, and revegetate rip-rap and constructed terrace (7/11 expense)
D. Construct ford on south approach to haul road bridge. Crossing should have concrete aprons with several 48" culverts that would supplement bridge flow conveyance when the stream discharge is between 5,000 and 10,000 cfs, preventing disruption of aggregate operations. At flows greater than 10,000 cfs, the culvert capacity will be exceeded and water would flow over the concrete apron onto the downstream floodplain (7/11 expense). An alternative option of a second bridge span could be considered in lieu of a ford.

Phase 2

A. Regrade extracted dredger tailing area on the south bank upstream of Roberts Ferry Bridge (river mile 40.3) to create a floodplain. Revegetate with native woody riparian species. (7/11 expense for regrading, PUBLIC expense for revegetation)

B. Purchase dredger tailing mineral rights between the extraction area and the Tuolumne River at river mile 40.3, restoring riparian floodway habitat at this location and using material to restore downstream floodplains
C. Secure riparian conservation easement on south bank from river mile 39.2 to 39.8.
D. Construct floodplain on south bank from river mile 38.8 to 39.1, reshape low water channel, and revegetate (PUBLIC expense)
E. Grade north bank gravel bar at river mile 38.3 to increase flood capacity and generate aggregate and riparian vegetation for restoration (PUBLIC expense)
F. Construct setback levee through south bank settling pond downstream of the 7/11 plant site from river mile 37.7 to 37.9 (PUBLIC expense)
G. Construct floodplain in settling pond from river mile 37.7 to 37.9 and revegetate with native woody riparian species (PUBLIC expense)
H. Construct floodplain in downstream south bank pond at river mile 37.6 and revegetate with native woody riparian species (PUBLIC expense)

M.J. RUDDY REACH

This reach is defined by the property line upstream of Joe Ruddy's orchard (river mile 37.7) downstream to Santa Fe haul road bridge (river mile 36.6) (Figure 4). The 1997 flood damaged the south bank of the 4-Pumps restoration project at river mile 37.5, connected to south bank ponds at river mile 37.1, 36.6, and 36.2, and connected to a north bank pond at river mile 36.7.

Phase 1

F. Patch levees downstream of Joe Ruddy's orchard at river mile 36.9 and 37.1(Under construction, at SANTA FE and LANDOWNER expense)
G. Patch south bank levee downstream of the haul road bridge river mile 36.6 (Done, at SANTA FE expense)

Phase 2

A. Build setback levee across south bank pond upstream of Joe Ruddy's orchard (river mile 37.6 to 37.7, isolating it from the river (cost-sharing: PUBLIC and LANDOWNER expense)
B. Reconstruct portions of the low water channel in the 4-Pumps restoration site from river mile 36.8 to 37.6, bioengineer approximately 500' of the south bank adjacent to orchard, and revegetate with native woody riparian species (PUBLIC expense)
C. Construct setback levee through south bank pond upstream of haul road bridge from river mile 36.6 to 36.9, construct floodplain, and revegetate with native woody riparian species (PUBLIC expense)
D. Construct setback levee through north bank settling pond upstream of haul road bridge from river mile 36.7 to 36.8, construct floodplain, and revegetate with native woody riparian species (PUBLIC expense)
E. Construct ford on north approach to haul road bridge at river mile 36.7. Crossing should have concrete aprons, and would convey flows greater than 6,000 cfs onto the downstream floodplain (SANTA FE expense).

WARNER/DEARDORFF REACH

The Warner/Deardorff reach is defined by the Santa Fe Aggregates haul road bridge (river mile 36.6) downstream to the entrance to Dan Casey Slough (river mile 35.2) (Figure 5). Damage during the 1997 flood consisted of numerous berm failures on the south bank downstream of the haul road bridge, destruction of the conveyor bridge, and connection of the Tuolumne River to the Tulare Pond at flows greater than 2,000 cfs.

Phase 1

G. Patch south bank levee from river mile 36.2 to 36.3 to prevent flood flow access to pond, and provide flood flow conveyance that would protect an extended conveyor bridge crossing (SANTA FE expense)

H. Bioengineering to protect the south bank levee and proposed conveyor bridge abutment from river mile 36.2 to 36.3 from future channel migration using bioengineering, and revegetate with native woody riparian species (PUBLIC expense).

Phase 2

H. Regrade aggregate storage area on north bank downstream of the haul road bridge from river mile 36.2 to 36.7 to convey high flows, reconstruct small levee if needed, purchase mineral rights if needed, and revegetate with native woody riparian species (PUBLIC expense)

I. Purchase mineral rights in Tulare Pond from river mile 35.7 to 36.2 to obtain materials for setback levee and floodplain construction (PUBLIC expense)

J. Construct setback levee and floodplain through pond using this material, regrade portions of the low water channel, and revegetate floodplain with native woody riparian species (PUBLIC expense)

K. Secure conservation easement or purchase mineral rights to south bank pre-dam floodplain from river mile 35.4 to 35.7, lower selected surfaces to post-dam floodplain elevation, use material to help fill Tulare Pond upstream, and revegetate (PUBLIC expense)

REED REACH

The Reed reach is defined by the entrance to Dan Casey Slough on the upstream end (river mile 35.2) and the downstream extent of the Reed Mitigation restoration project on the downstream end (river mile 34.3) (Figure 6). Damage during the 1997 flood was minimal, limited to the upstream and downstream ends of the existing south bank pond at river mile 34.5.

Phase 1

J. Block flood flow access to pond entrance and exit (river mile 34.4, 34.5, and 34.65) for flows less than 11,000 cfs (REED expense)

Phase 2

N. Purchase mineral rights in Reed pond area for setback levee and floodplain construction, lower selected surfaces downstream of pond to post-dam floodplain elevation, and use material to help fill pond (PUBLIC expense)

O. Construct setback levee through pond from river mile 34.4 to 34.7, create floodplain, and revegetate floodplain with native woody riparian species (PUBLIC expense)

MONITORING

The large size of this project and the objective of preventative maintenance to restore and preserve salmonid habitats necessitates a monitoring program that focuses on discrete issues. For example, one primary objective of restoring a larger functional floodway is to prevent future salmonid mortality from pit connection or capture, which can be simply monitored by documenting the reduced occurrences of levee failure. More detailed monitoring should target the effectiveness of differing bioengineering approaches, testing different riparian restoration strategies (e.g., irrigation, cuttings, creation of surfaces conducive to natural regeneration), channel migration rates, and salmonid spawning and rearing use within the restored floodway.

TIMELINE

PHASE 1

Optimum funding date: 7/1/97
Field reconnaissance, final design documents, and field staking: 7/1/97-9/1/97
Permitting: 7/1/97-9/1/97
Construction: 9/1/97-4/98
Revegetation (mostly bank protection on outsides of meander bends): 11/1/97-1/1/98

PHASE 2

Expected funding dates: 9/1/97 and 9/1/98
Field reconnaissance, final design documents, and field staking: 9/1/97-4/1/98
Permitting: 9/1/97-4/1/98
Construction: 6/1/98-10/30/99
Revegetation: 1/98-11/99
Monitoring: 11/99-2001

COSTS

The costs provided below are delineated by reach and by phase, and estimate PUBLIC costs only. Phase 1 items are deemed "fast track" items to be implemented in FY1997, thus should have priority for immediate funding. Phase 2 items target implementation in FY1998 and 1999, so appropriating funding in FY1997 would provide ample time for final designs and permit procurement in a more reasonable time frame. Permitting could also be separate for Phase 1 and 2 due to the differing time frame for each. More detail for the following cost estimates are provided in Table 2. Conservative cost estimates for the material purchase, earth moving, transportation, and other "big ticket" items were made to prevent underestimating project costs, and as an additional conservative measure, a contingency of 10 percent of construction costs were also added.

Phase 1	
Permitting, field reconnaissance, and design	$190,000
Field staking, construction supervision	$76,000
Aggregate, topsoil, and other materials; Construction	$526,000
Riparian revegetation and bioengineering	$278,000
Project management and administration (3%)	$32,000
TOTAL PHASE 1 COST TO PUBLIC FUNDING SOURCES:	**$1,102,000**
Phase 2	
Permitting, field reconnaissance, and design	$395,000
Field staking, construction supervision	$114,000
Aggregate, topsoil, and mineral rights/land purchase; Construction	$12,812,000
Riparian revegetation and bioengineering	$1,097,000
Monitoring	$150,000
Project management and administration (3%)	$434,000
TOTAL PHASE 2 COST TO PUBLIC FUNDING SOURCES:	**$15,001,000**
CONTINGENCY (10% of construction):	**$1,471,000**
GRAND TOTAL:	$17,574,000

TABLE 1. COST SUMMARY FOR RESTORING TUOLUMNE RIVER FLOODWAY THROUGH GRAVEL MINING REACH

Estimated bioengineering cost (labor and materials)= $200/ft
Estimated floodplain revegetation cost (labor and materials)= $7,000/acre
Estimated mineral rights purchase cost (private)= $1.28/cu yd
Estimated mineral rights purchase cost (commercial)= $2.00/cu yd
Estimated aggregate purchase cost= $6.00/cu yd
Estimated dredger tailing purchase+haul cost= $4.60/cu yd
Estimated topsoil purchase cost= $2.40/cu yd
Estimated off-site source transportation cost (<10 miles)= $4.60/cu yd
Estimated equipment cost for local material moving= $3.00/cu yd
Ton to cubic yard conversion= 1.6 t/cu yd
Width of non-haul road levee= 25 feet

PHASE 1 PROJECTS

7-11 REACH (River mile 37.7 to 40.3)

A: Construct setback levee

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material + trans cost	Equipment cost	TOTAL COST
350	12	708	9,178	Dredger	$4.80	$44,053	$27,533	$71,587
1,100	8	282	11,489	Dredger	$4.80	$55,147	$34,467	$89,613
7/11 CONTRIBUTION FOR BUILDING HAUL ROAD								-$85,000
								$76,200

B: Move Levee and revegetate

Length (ft)	Depth of cut (ft)	Width of levee cut and move	Volume (cu yd)	Equipment cost	TOTAL COST
3,000	8	25	22,222	$66,667	$66,667
7/11 CONTRIBUTION IN PLACE OF HARD POINTS AND COBBLE FACING					-$50,000
					$16,667

C: Extend rip-rap upstream of haul road bridge
CONSTRUCTED BY 7/11 MATERIALS

D: Construct fair weather crossing south of bridge
CONSTRUCTED BY 7/11 MATERIALS

M.J. RUDDY REACH (river mile 37.7 to 36.6)

E: Construct setback levee and floodplain, revegetate

Height of	X section	Volume	Material +	Equipment	TOTAL

Length (ft)	Levee (ft)	area (ft)	(cu yd)	Material	Cost/cu yd	trans cost	cost		COST
640	26	2002	47,455	Dredger	$4.80	$227,783	$142,364		$370,148

LANDOWNER CONTRIBUTION TO REPAIR 11,000 CFS LEVEE

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material + trans cost	Equipment cost		
200	10	450	3,333	Dredger	$4.80	$16,000	$10,000		-$26,000

Area (sq ft)	Depth (ft)	Volume (cu yd)	Material	Cost/cu yd	Material + trans cost	Equipment cost	Revegetation cost	
17,000	12	7,556	Dredger	$4.80	$36,267	$22,667		$58,933
17,000	6	3,778	Topsoil/dredger	$4.80	$18,133	$11,333	$10,000	$39,467
								$442,548

F: Patch levees upstream of plant site

CONSTRUCTED BY SANTA FE AGGREGATES FOR LANDOWNER (UNDER CONSTRUCTION)

G: Patch levee downstream of haul road bridge

CONSTRUCTED BY SANTA FE AGGREGATES (COMPLETED)

WARNER/DEARDORFF REACH (river mile 36.6 to 35.2)

H: Patch levee at old conveyor bridge location and reconstruct 500 ft wide conveyor bridge

CONSTRUCTED BY SANTA FE AGGREGATES

I: Bioengineering and revegetation levee at old conveyor bridge location

Total length (ft)	Width of floodplain	Reveg cost	Equipment cost	Bioengineering length (ft)	Bioengineering cost	TOTAL COST
1,150	100 ft	$18,480	$20,000	1,150	$230,000	**$268,480**

REED REACH (River mile 35.2 to 34.3)

J. Patch entrance and exit to existing pond

CONSTRUCTED BY REED (UNDER 1603 PERMIT RESPONSIBILITIES)

PERMITTING	
Lead Agency staff or consultants	**$50,000**
FIELD RECONNAISSANCE	
Collect HEC-2 data for levee design (3 wks) + 2 wks misc topo data gathering	**$40,000**
DESIGN	
Lead Agency staff or consultants, run HEC-2 model, consult with aggregate miner engineers	**$100,000**
FIELD STAKING AND CONSTRUCTION SUPERVISION	
Lead Agency staff or consultants (1 person, 8 months)	**$76,120**

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PROJECT MANAGEMENT AND ADMINISTRATION

Lead Agency **$32,100**

TOTAL PHASE 1 COSTS: $1,102,115

PHASE 2 PROJECTS

7-11 REACH (River mile 37.7 to 40.3)

A: Regrade and revegetate permitted dredger tailing area upstream of Roberts Ferry

Surface area (sq ft)	Reveg cost	Equipment cost	Regrading cost	TOTAL COST
561,400	$90,216	$20,000	CONSTRUCTED BY 7/11 MATERIALS	**$110,216**

B: Purchase mineral rights to dredger tailings upstream of Roberts Ferry Bridge (reveg cost in "A")

Volume (cu yd)	Material purchase	TOTAL COST
125,000	$160,000	**$160,000**

C: Conservation easement adjacent to Roberts Ferry Bridge, revegetate

Total area (acres)	Conservation easement	Revegetation cost	TOTAL COST
22.8	$45,689	$159,910	**$205,599**

D: Purchase mineral rights, construct floodplain, and revegetate

Area (sq ft)	Depth (ft)	Volume (cu yd)	Material	Phase 2B Cost/cu yd	Material + trans cost	Equipment cost	Revegetation cost	TOTAL COST
406,000	4	43,892	Dredger	$4.80	$210,681	$131,676		$342,357
406,000	6	65,838	Topsoil/dredger	$4.80	$316,022	$197,514	$65,243	$578,778

MINERAL RIGHTS	Volume (cu yd)	Material purchase	
	60,000	$120,000	$120,000
			$1,041,135

E: Grade north bank gravel bar upstream of haul road bridge

Area (sq ft)	Vol generated (cu yd)	Equipment cost	TOTAL COST
164,400	5,000	$15,000	**$15,000**

F: Bioengineering and revegation on small floodplain

Total length (ft)	Width of floodplain	Reveg cost	Equipment cost	Bioengineering length (ft)	Bioengineering cost	TOTAL COST

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3,100	25 ft	$12,454	$20,000	1,560		$312,000			**$344,454**

G: Construct setback levee through settling pond

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material + trans cost	Equipment cost		TOTAL COST
1500	12	588	32,667	Dredger	$4.80	$156,800	$98,000		**$254,800**

H: Construct floodplain in pond downstream of haul road bridge and revegetate

Area (sq ft)	Depth (ft)	Volume (cu yd)	Material	Cost/cu yd	Material + trans cost	Equipment cost	Revegetation cost	TOTAL COST
428,400	10	158,667	Dredger	$4.80	$761,600	$476,000		$1,237,600
428,400	6	95,200	Topsoil/dredger	$4.80	$456,960	$285,600	$68,843	$811,403
								$2,049,003

M.J. RUDDY REACH (river mile 37.7 to 36.6)

I: Reconstruct low water channel in 4-pumps site, bioengineering, revegetation

Estimated constr time	(assume 2 pieces at $1000/day each)	Equipment cost	Revegetation cost	Bioengineering length (ft)	Bioengineering cost	TOTAL COST
5 weeks		$50,000	$40,000	500	$100,000	**$190,000**

J: Construct south bank setback levee and floodplain upstream of haul road bridge with Phase 2-B material, revegetate

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material cost	Transp. cost	Equipment cost		TOTAL COST
1330	24	1752	86,302	Aggregate	$6.00	$517,813	$414,251			$932,064

Area (sq ft)	Depth (ft)	Volume (cu yd)	Material	Cost/cu yd	Material cost	Transp. cost	Equipment cost	Revegetation cost	
286,750	4.5	47,792	Phase 2-B dredger tailings	$0.00	$0	$229,400	$143,375		$372,775
286,750	3.5	37,171	Phase 2-B dredger tailings	$0.00	$0	$178,422	$111,514		$289,936
286,750	6	63,722	Topsoil	$2.40	$152,933	$305,867	$191,167	$46,080	$696,047
									$2,290,822

K: Construct north bank setback levee and floodplain upstream of haul road, revegetate

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material cost	Transp. cost	Equipment cost		TOTAL COST
1190	22	1518	66,904	Aggregate	$6.00	$401,427	$321,141	$200,713		$923,281

Area (sq ft)	Depth (ft)	Volume (cu yd)	Move Irrigation pump	Material	Cost/cu yd	Material cost	Transp. cost	Equipment cost	Revegetation cost	
120,000	8	35,556		Aggregate	$6.00	$213,333	$170,667	$106,667		$490,667
120,000	4	17,778	$10,000	Topsoil	$2.40	$42,667	$85,333	$53,333	$19,284	$210,617
										$1,624,565

L: Construct fair weather crossing on north side of bridge
CONSTRUCTED BY SANTA FE AGGREGATES

WARNER/DEARDORFF REACH (river mile 36.6 to 35.2)

M: Regrade and possible levee at aggregate storage area near plant site

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Cost/cu yd	Material cost	Transp. cost	Equipment cost	Revegetation cost	TOTAL COST
1,500	4	132	7,333	Aggregate	$6.00	$44,000	$35,200	$88,000	$24,105	**$191,305**

N: Mineral rights purchase in Warner Pond

Total area (sq ft)	Est depth of material (ft)	Volume of aggregate(cu yd)	Material	Material purchase	TOTAL COST
1,300,000	14	674,074	Aggregate	$862,815	**$862,815**

O: Construct setback levee and floodplain in Warner Pond, revegetate

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Equipment cost		TOTAL COST
2150	10	450	35,833	Aggregate	$107,500		$107,500
Excavated Area (sq ft)	Depth (ft)	Volume (cu yd)	Material		Equipment cost	Revegetation cost	
750,000	10	277,778	Aggregate		$833,333		$833,333
750,000	4	111,111	Topsoil		$333,333	$120,523	$453,857
Rough calculations show that excavated material is sufficient to create floodplain and levees							**$1,394,690**

P: Deardorff conservation easement and mineral right purchase

Minable area (ac)*	Tons per acre	Total area (acres)	Volume of purchase (cu yd)	Regrading volume (cu yd)	Mineral right cost	Equipment cost	Revegetation cost	TOTAL COST
20.0	50,000	26.1	1,306,818	64,667	$801,653	$73,905	$70,145	**$945,702**

** conservative estimate, probably near 15 acres with regulatory setbacks*

REED REACH (River mile 35.2 to 34.3)

Q: Aggregate purchase in and adjacent to Reed Pond

Purchase area (sq ft)	Purchase area (ac)*	Est depth of material (ft)	Volume of aggregate(cu yd)	Material	Material purchase	TOTAL COST
784,080	18	28	813,120	Aggregate	$1,626,240	$1,626,240
323,000	12	5	59,815	Aggregate	$119,630	$119,630
**Estimated from Reed County Use Permit Application and Reclamation Plan*						**$1,745,870**

Rough calculations show that excavated material is sufficient to create floodplain and levees

R: Construct setback levee and floodplain through pond, revegetation

Length (ft)	Height of Levee (ft)	X section area (ft)	Volume (cu yd)	Material	Equipment cost		TOTAL COST
1420	10	450	23,667	Aggregate	$71,000		$71,000
Area (sq ft)	Depth (ft)	Volume (cu yd)		Material	Equipment cost	Revegetation cost	
240,000	10	88,889		Aggregate	$266,667		$266,667
240,000	4	35,556		Topsoil	$106,667	$38,567	$145,234
							$482,901

PERMITTING

Lead Agency staff or consultants $75,000

FIELD RECONNAISSANCE

Topographical data gathering, gravel source search and surveying, vegetation [illegible] $70,00

DESIGN

Lead agency staff or consultants [illegible]

[illegible]

SERVER\FILES\TUOLUMNE\TID\PROPOSAL\CALFED\GRAVEL BUDGET V2.XLS

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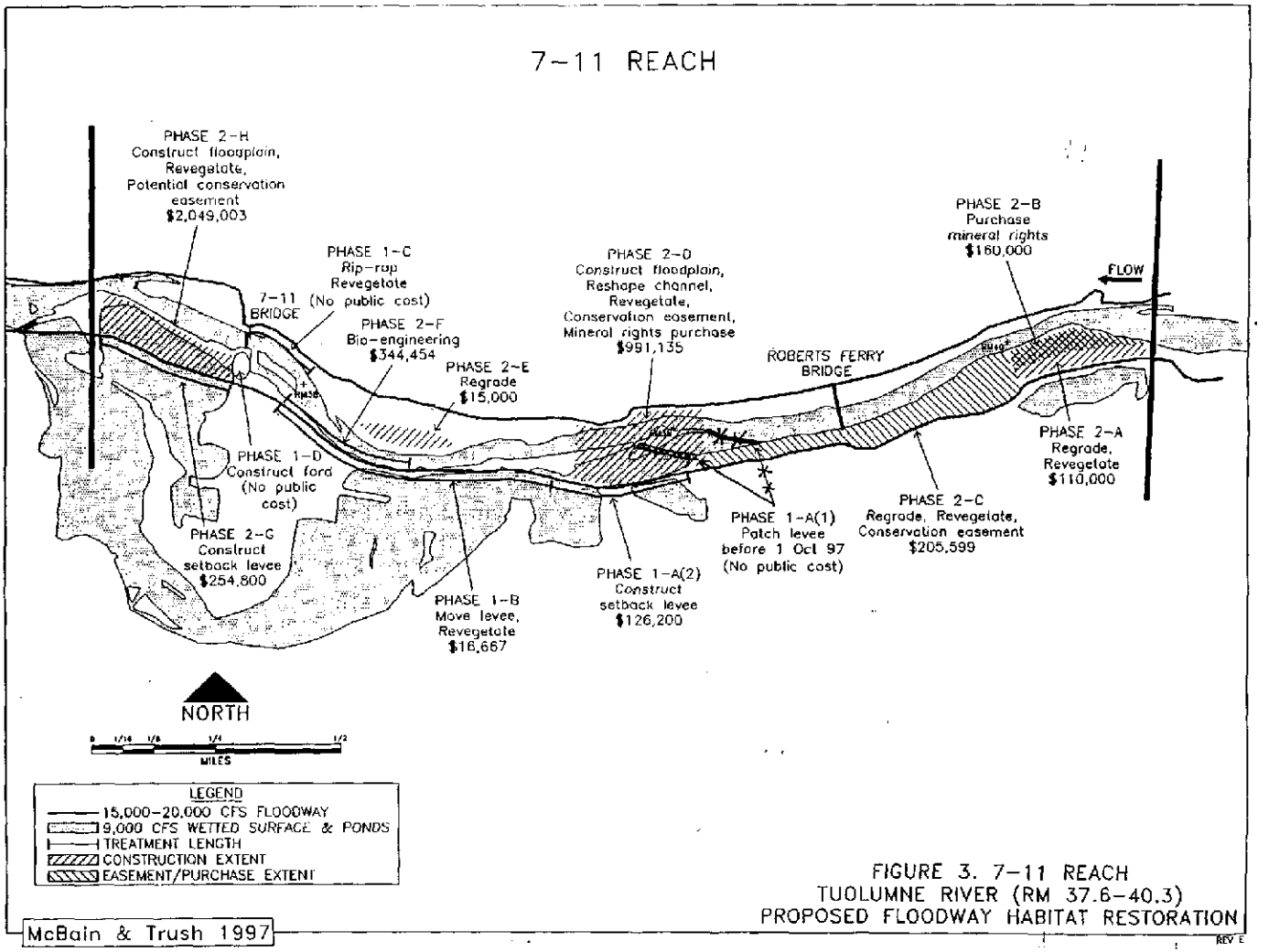

FIGURE 3. 7-11 REACH
TUOLUMNE RIVER (RM 37.6-40.3)
PROPOSED FLOODWAY HABITAT RESTORATION

REV E

I-002972

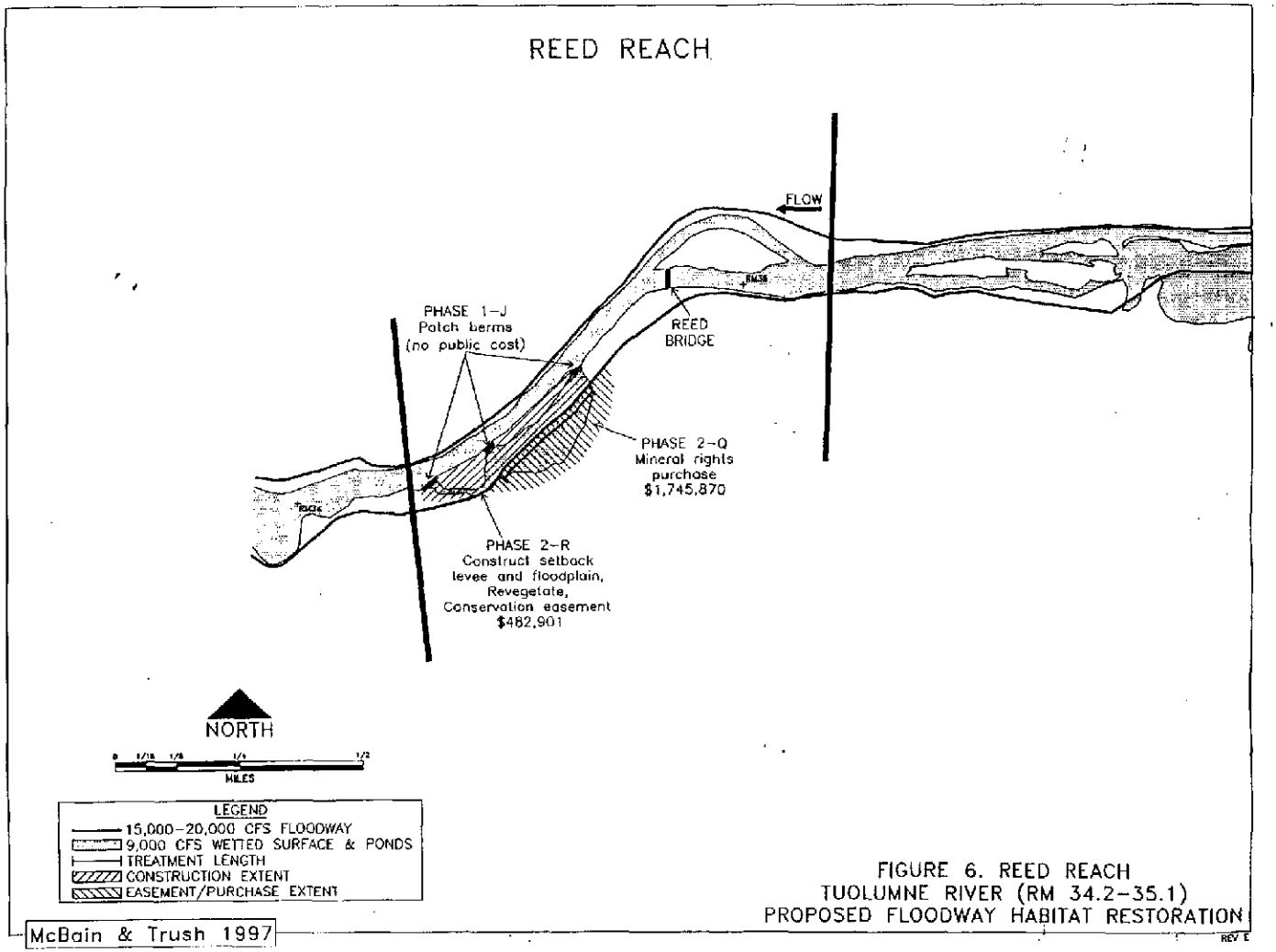

FIGURE 6. REED REACH
TUOLUMNE RIVER (RM 34.2–35.1)
PROPOSED FLOODWAY HABITAT RESTORATION

REV E

I—002973

I-002973

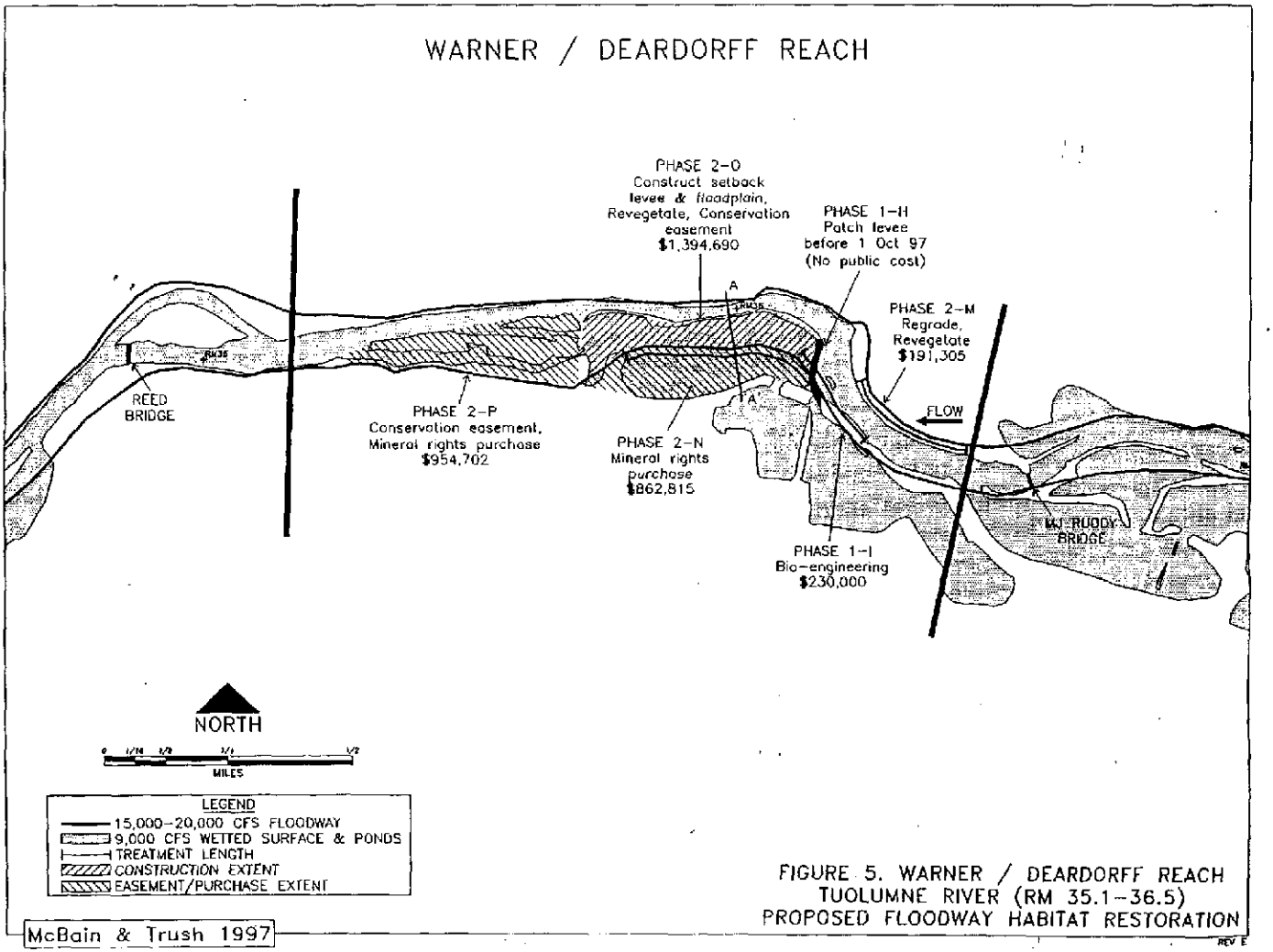

FIGURE 5. WARNER / DEARDORFF REACH
TUOLUMNE RIVER (RM 35.1-36.5)
PROPOSED FLOODWAY HABITAT RESTORATION

REV E

I-002974

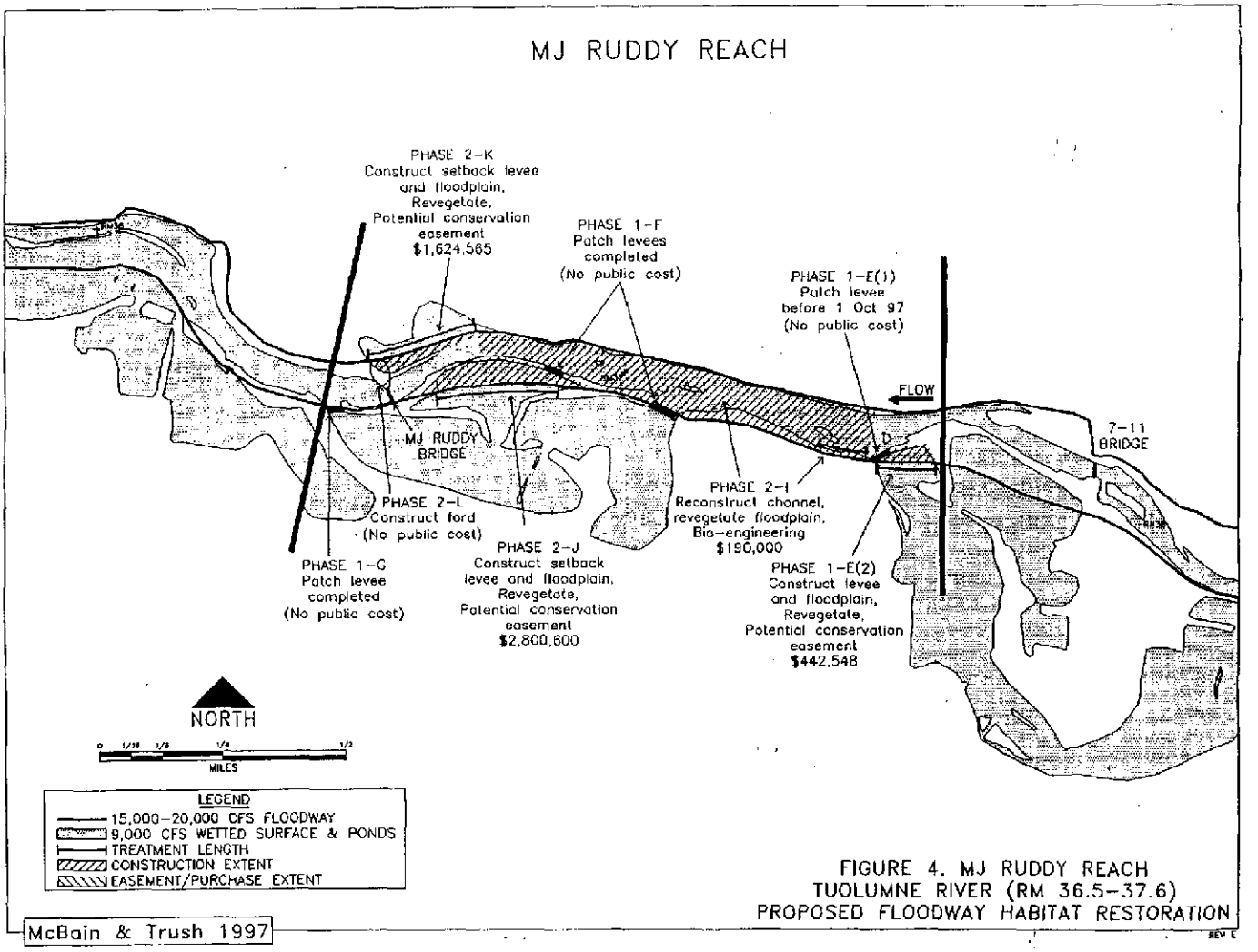

FIGURE 4. MJ RUDDY REACH
TUOLUMNE RIVER (RM 36.5-37.6)
PROPOSED FLOODWAY HABITAT RESTORATION

REV 6

I-002975

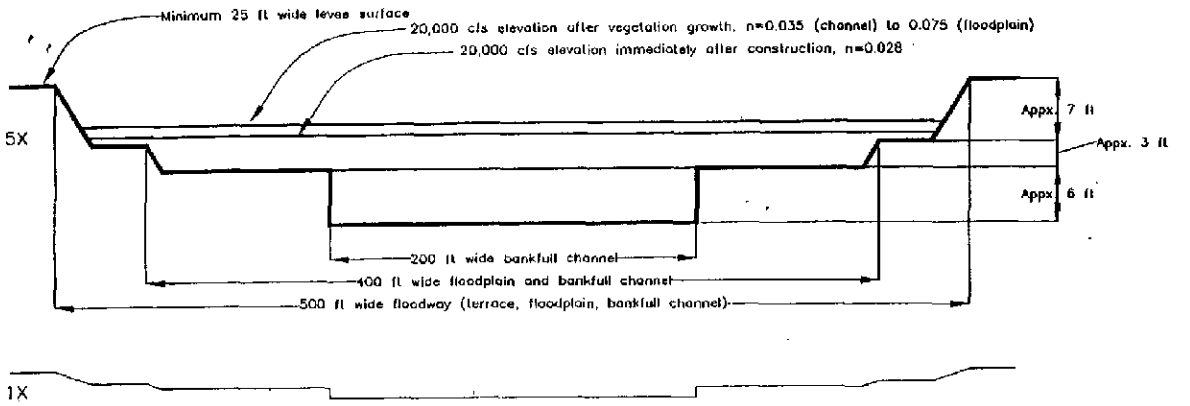

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FIGURE 7. SIMPLIFIED FLOODWAY DESIGN TRANSECT

REV 0

I-002976

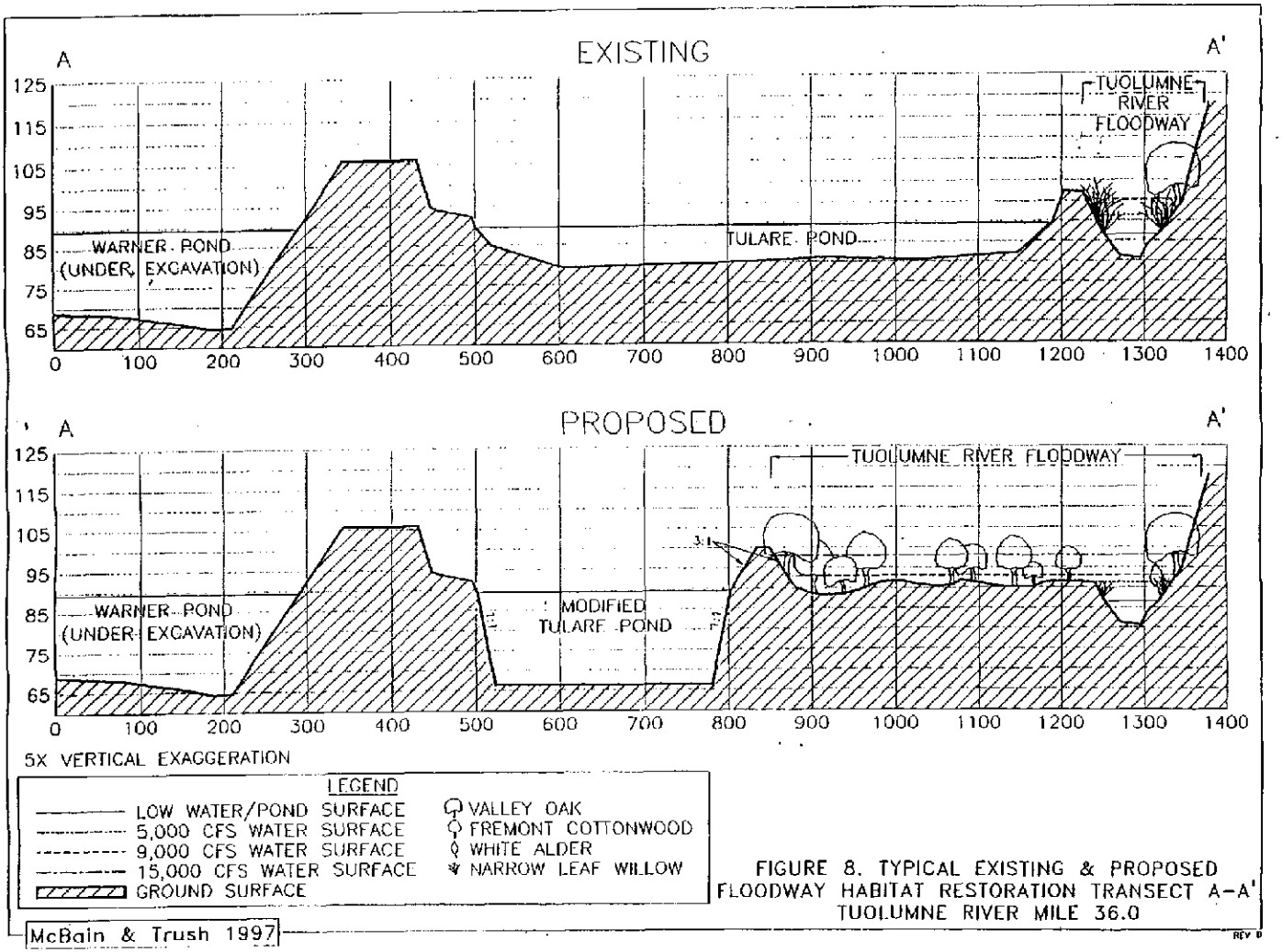


FIGURE 8. TYPICAL EXISTING & PROPOSED FLOODWAY HABITAT RESTORATION TRANSECT A-A' TUOLUMNE RIVER MILE 36.0

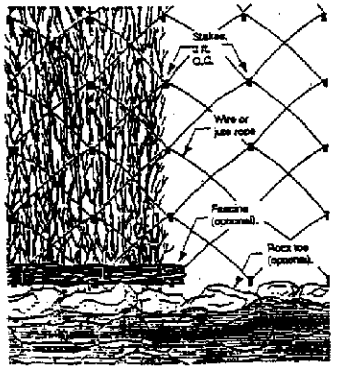
REV 0

I—002977

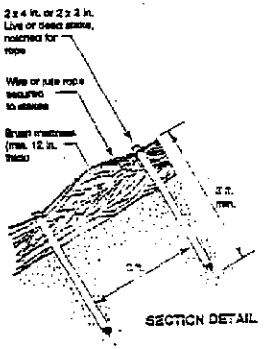
I-002977

SALIX BRUSH MATTRESS

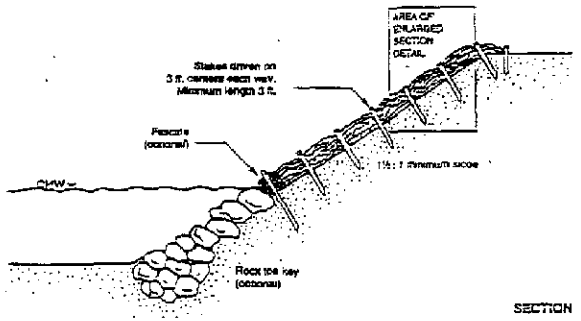
By King County Dept. of Public Works (1993), adapted from Gray & Leiser (1982)



ELEVATION



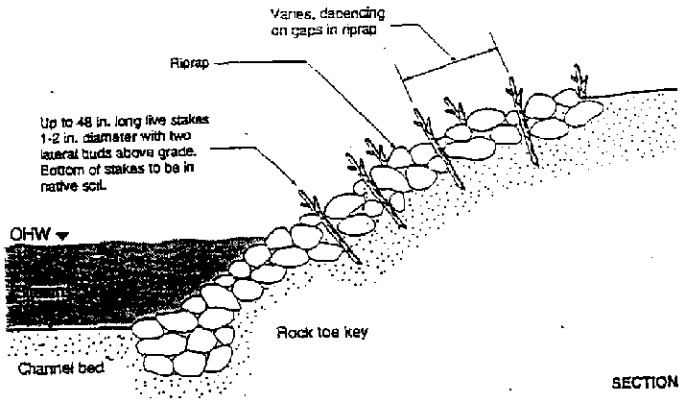
SECTION DETAIL



SECTION

SALIX/POPULUS JOINT PLANTING

By King County Dept. of Public Works (1993)



SECTION

McBain & Trush 1997

FIGURE 9. TYPICAL BIO-ENGINEERING STRATEGIES

REV 0